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EDITORIAL.

Co-operation.

In the present number of the Malayan Agricultural Journal will be found an abstract of a paper by the Director of Agriculture, Gold Coast, on the subject of the organisation of co-operative marketing of cacao from small holdings, together with an account prepared by Mr. F. G. Spring, attached to the Co-operative Department, Federated Malay States, of the efforts now being made by that Department to organise the co-operative preparation and marketing of rubber from small holdings in Malaya. Taken together, the two articles form an interesting commentary on a problem which is of world-wide importance.

The improvement of peasant agriculture is one of the most difficult questions which administrations have to face and while a great deal can undoubtedly be done in the way of introducing new industries, improved methods of cultivation, new varieties of crops and so on, these efforts are bound, to a large extent, to be discounted if due attention is not paid to the cognate problems of assisting the small-holder to dispose of his produce to the best advantage. Usually small-holders' methods of preparing their produce for the market are defective, while unaided, they are unable to market it to the best advantage owing to the inferior quality of the produce and the unorganised state of the producers. They are thus liable to be exploited by small buyers who purchase their produce in small lots for cash and re-dispose of it to larger buyers who in turn reap their profits on the transaction.

Not infrequently, small growers are forced by circumstances to hypothecate their crops in advance to local shop-keepers in return for goods supplied and are forced to accept whatever prices are offered to them, there usually being some form of arrangement between the buyers of this sort whereby prices are kept at a low level. Such a state of affairs cannot make for improvement and largely vitiates any efforts that may be made to improve production in other directions. An exception to this sometimes occurs in areas where large factories for handling produce exist which are dependent for an appreciable fraction of their output on the produce of small-holders. This is probably most clearly shown in the case of the cane sugar industry in certain countries, notably in Mauritius and Trinidad among British possessions, and in Cuba and Porto Rico among foreign producing countries. In these places, large central factories have been established by private enterprise and efficient

working is dependent on the factories being able to operate somewhere in the region of their full capacity; this can often only be achieved by purchase of peasant-grown products on a large scale. In such circumstances, considerable competition exists for produce and the result is that prices paid for the produce of small-holders frequently attain high levels. In such conditions, the needs of the small-holder, from the market point of view, may be regarded as being fully met. On the other hand, such conditions are, generally speaking, the exception rather than the rule. In Malaya, for example, the average estate rubber factory declines to handle the latex of small producers, because of its defective condition owing to the presence of dirt and other impurities, and also owing to the risk of adulteration and the necessity of keeping greatly increased accounts. It appears to be mainly for this reason that purchasing of small-holders' latex by rubber factories in Malaya has failed to materialise on a scale of any importance. In these circumstances, the move now being made by the Co-operative Department in the direction of the establishment of co-operative rubber factories which will purchase small-holders' latex for cash and dispose of the produce on profit sharing lines appears to be about the only line of attack on the problem that is feasible.

There is no question that advance along these lines necessitates a great deal of spade work, especially in the early stages; but there is also little doubt that provided these efforts are successful and the factories when established are run on sound lines, in due course they will teach the lesson which they are intended to teach viz., that co-operative preparation and marketing, efficiently carried out, means more money to the small-holder. The possible extension of the co-operative principle to other crops is also a matter of interest and there would appear to be considerable scope for the organisation of the marketing of small-holders' produce on co-operative lines in relation to such crops as copra, arecanuts and many other products.

In this connection, it is perhaps interesting to allude to Government produce purchase schemes, which are in reality a form of co-operation and which have successfully worked in a number of tropical countries. Instances of this which may be quoted are the Government cotton purchase scheme in Uganda on which the prosperity of that Protectorate has been very largely built; the smaller similar cotton purchase schemes which have been worked for many years in a number of the West Indian Islands; the tobacco and cotton purchase schemes which have operated for a number of years in Ceylon; but a distinction must, however, be drawn between this type of effort—in which the whole of the operations are financed and controlled by the Government—and the truly co-operative schemes in which the financial arrangements are provided in the first instance by the small-holders themselves, who raise a nucleus of the capital required among their membership and pledge their credit for the balance. Undoubtedly this latter procedure involves considerably greater difficulties in the early stages, but it seems probable that by developing a spirit of self-reliance and willingness to combine among the small-holders themselves, the additional effort required and the slowing up of progress in the early stages which are

inevitable concomittants of its adoption, may in the long run, be well worth the extra trouble involved.

The future of these produce purchase schemes in Malaya and on the Gold Coast are full of interest and if in due course they bear fruit, then it may be reasonably expected that they should pave the way for the partial solution of a difficult problem in both countries.

In conclusion, a word may be said as to the relationships existing between the official organisations for co-operation and agriculture. It is now becoming generally recognised that co-operative and economic work form the logical extension of the operations of a Department of Agriculture. The two branches are mutually complimentary and it has been truly said that the work of the co-operative organisation begins where that of the agricultural organisation leaves off. It is the work of a Department of Agriculture to endeavour to point out the means whereby agricultural methods and processes in crop production can be improved. In the commercial application of these results and particularly in the region of financing and marketing the produce lies the rôle of the co-operative organisation. In some countries, e.g., Ceylon and the Gold Coast, the Co-operative organisation forms a wing of the agricultural organisation. In other countries, e.g., Malaya and India, separate organisations are provided for each service. Whichever form of organisation is adopted, it is, however, essential that close liaison should be maintained between the two branches, if really effective work is to be performed.

Labuan.

Interest attaches to the article on Agriculture in Labuan by Mr. Sands, which appears in the present number of The Malayan Agricultural Journal. At the request of the Resident, Mr. Sands paid a visit to this dependency in July, 1929, with a view to reporting on agricultural conditions, and the present article has been prepared on the basis of information collected on that occasion. Geographically, Malaya and its dependencies are an entity and consequently, as the prosperity of Malaya as a whole is largely dependent on agriculture, interest attaches to the agricultural conditions obtaining in any part thereof.

Probably the fact which strikes the new-comer to Malaya most forcibly is the extraordinary degree of divergence which prevails in the standard of development attained in different places. In the Straits Settlements and those portions of the Federated and Unfederated Malay States lying on the Western side of the central mountain range, development has been pushed to a remarkable pitch in a comparatively short space of time. On the Eastern side of the range and in the outlying possession, development has been much less rapid. It seems reasonable to suppose that within the next fifty years, considerable further developments are likely to take place in these areas. As a preliminary to development, systematic surveys of the resources of the undeveloped areas is an obvious necessity and from time to time as an opportunity permits, it is hoped to publish in this Journal accounts of the agricultural conditions in these regions of Malaya.

Stem Rot of Oil Palms.

On page 184, an important article on a disease of oil palms appears, written by Mr. Sharples, Government Mycologist and Mr. L. P. Jorgensen, the well-known authority on oil palm planting. The attention of the Department was directed to the serious nature of the disease by Mr. Jorgensen, and he kindly consented to put on record his field information, which is incorporated in the article. This is essentially a preliminary report, written to call attention to the existence of a serious affection against which preventive measures may have to be undertaken in the early years when leaf pruning is first started. At the present time, the evidence strongly favours the view that, in the great majority of cases, the fungus gains an entry into leaf-bases through the tissues exposed in pruning, passes down the leaf-base into the stem and spreads rapidly in a horizontal direction. There is some evidence to indicate that a direct attack on the stem tissues can be made without prior growth through the leaf bases, owing to the spores of the fungus lodging in the leaf axils, between the leaf-bases and the stem; the conditions for germination of the spores and growth of the fungus could not be otherwise than favourable in such a position and it may be anticipated that such direct attack on the stem tissues will be proved by further work.

It is of interest to add that the fungi so far found in Malaya associated with this Stem-Rot of oil palms are

(a) *Fomes lamaoensis*, which to rubber planters is well known as the cause of Brown Root disease.

(b) *Ganoderma lucidum*—(*Fomes lucidus*) which has been found associated with a stem-rot of oil palms in West Africa. The suggestive character of this observation is very obvious and it may be that it will ultimately be found to constitute a relationship of considerable importance. On the other hand, the point must not be overlooked that while close association of a definite fungus with definite symptoms is a useful guide, either of the two above-mentioned fungi may be purely secondary and the true cause prove to be quite a different organism.

AGRICULTURE IN LABUAN.

BY

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The small island of Labuan lies off the West Coast of British North Borneo. Its area is about 30 square miles. At its nearest point it is only six miles distant from the large island. There are a number of small islands included in the Settlement. The more important of these, from an agricultural standpoint, are Kuraman near to the southern end of the island and Da'at off the south-east coast. Labuan possesses, in Victoria Harbour, an excellent deep-water port with good shipping facilities. A large transhipment trade is carried on with Brunei, British North Borneo and Sarawak. Local produce and livestock shipped by steamer reach the markets of Miri in Sarawak in 10 hours and in Singapore in $3\frac{1}{2}$ to 4 days.

The country is undulating with low hills, the highest of which reaches a height of 300 feet only. The soils are derived from sandstone and shale: they are often shallow, with the subsoil hard and impervious and taken as a whole, are not very fertile. There are no forests, but large areas are covered with secondary bushy growths of mixed species of plants with the 'simpak' (*Wormia Burbidgei*), 'puak' (*Fagraea crassipes*) and 'sendudok' (*Melastoma polyanthum*) predominating, or with the 'lallang' grass (*Imperata arundinacea*). Bush and grass fires are common in the drier months of the year.

The rainfall is heavy and fairly well distributed throughout the year. The average annual precipitation for the past seventeen years was 137.71 inches.

The driest months are February and March with averages of 6.66 and 5.80 inches respectively. The month of April is usually a wet one with 14.28 inches, whilst for the period September to December, the monthly rainfall averages over 15 inches per month.

The population in 1928 was estimated at 5,904 persons, consisting mainly of Kedayan Malays, who are very poor cultivators, and Chinese. Among the latter are Hokkien and Kheh settlers who are good land-workers. Should the coal-mines of the island be successfully re-opened there would immediately be a considerable increase in population.

A good system of metalled and earth roads and bridlepaths is being formed; this will enable produce and stock to be transported quickly and economically to Victoria Harbour. The beneficial effects of these works of public utility are already evident in that there is now a demand, particularly by Chinese settlers, for land near to the roads for coconuts, rubber, vegetables and fruit.

The area under cultivation is estimated at 10,250 acres, made up approximately of coconuts 3,500 acres, rubber 2,750 acres, padi 1,900 acres, and other crops 2,100 acres.

As will be shown later, the acreages given under coconuts and rubber are not strictly comparable with similar areas of plantations and small holdings

elsewhere for most of them are overgrown with secondary growth and 'lallang' grass; many are very deficient in number of trees and carry trees badly damaged in various ways.

In 1928 the chief exports of local produce and livestock were:—

Rubber	...	69 tons	valued at	$46,400
Copra	...	196 ,,	,,	36,272
Fresh vegetables	...	91 ,,	,,	10,764
Fruit	...	52 ,,	,,	10,098
Cattle and Pigs	...	200 head	,,	8,256
Padi	...	60 tons	,,	4,821

Although 60 tons of padi were exported, chiefly to Brunei, the imports of polished rice far outweighed that quantity. The fresh vegetables, fruit and livestock were exported mainly to Miri in Sarawak where there is an extensive oil-field employing a large number of Europeans, Chinese and other people.

Leases of Crown lands are disposed of by public auction. It is the practice now to issue leases for a term of 30 years, but most of the lands are held under 99 years leases. The minimum quit rent chargd is one dollar per acre.

With the exception of two estates with a total planted area of 1,300 acres of coconuts and 180 acres of rubber, the cultivated area consists of small holdings. The labour supply available on the estates is mainly Kedayan. The people work on a share system, but they are not satisfactory workers because they do not use agricultural implements but rely almost entirely on a long sword-like knife, (parang) for most operations. The Kedayan small-holdings are, as a rule, in very poor order, whereas those of the Chinese are far more carefully cultivated.

In all parts of Labuan, wild pigs do an immense amount of damage to food crops, whilst monkeys and squirrels often cause extensive damage to coconuts and fruit. Many common insect pests of similar crops in Malaya are present.

The coconut palm is more extensively grown than any other plant. The acreage under it is estimated at 3,500 acres, giving a yield, based on exports* of 125½ lbs. of copra per acre. At to-day's value (Aug: 1929) in Singapore this produce is worth $8.50 only, less commission, insurance and freight charges. All of the copra is sun-dried. On low-lying land near the sea, in small valleys and on islets off the coast, the palms yield fairly well. No attention is given to the cultivation of the crop or drainage of the land. The healthiest coconuts grown on any considerable scale were seen on the islets of Kuraman and Da'at; here cattle are allowed to graze under the palms on pasturage consisting for the most part of the hardy 'love-grass' (*Chrysopogon aciculatus*). On these islets, fairly close attention is given to the control of insect pests, more particularly the rhinoceros beetle (*Oryctes rhinoceros*) and the red stripe weevil (*Rhynchophorus Schach*).

* Local consumption would not be large.

On the main island, a far different state of affairs exists. Whilst it is possible to note flourishing palms, there is a very large number of small-holdings where the palms are badly neglected; where many are dead or dying and others damaged by insect pests.

The general practice in planting up an area with coconuts is to clear and burn off the trees, bush and grass and then plant up the land with hill-padi, tapioca, bananas or pineapples, amongst which the young coconuts are planted. By the time the catch-crops of the earlier years are taken off, the land, never particularly rich, is much reduced in fertility; not alone by the exhaustive effects of the temporary crops, but also as a result of the heavy soil erosion which takes place, more particularly on the sloping lands, in the absence of head, contour or other drains, silt pits, or cover crops.

When no further planting is possible and in the absence of stock, the land under the palms is quickly covered with bushes and 'lallang' grass, and this may not be cut back from the palms. Wild pigs always take a heavy toll of the young palms; in one district alone, 200 acres had recently been destroyed by them.

Then again, a most harmful system is frequently adopted on small neglected holdings, which consists of heaping bush, grass and leaves at the bases of mature trees and setting fire to them. It is believed by the peasantry that the burning of the coconut trunks induces fruit production. Whether there is—or is not—a temporary stimulation of fruiting, the ultimate result is disastrous, as can be seen in the large number or badly damaged trunks in various stages of decay and dead and dying palms. The damage done by the rhinoceros beetle is extensive, and this pest will continue to give trouble unless the usual measures for its control can be enforced.

Generally speaking, the Para rubber tree does not develop well under local conditions. Unsuitable soil and poor methods of cultivation are, without doubt, the reason for this. The area planted amounts to about 2,750 acres. There are no plantations exceeding 100 acres, in fact, there is only one approaching that area. Most of the rubber, therefore, is on the lands of the peasantry. There are about 200 small rubber holdings. The best areas—and these are poor from a Malayan standpoint—are chiefly those belonging to Chinese settlers. Even these are mostly in secondary growth or 'lallang' grass, with strips of land cleared in the lines of the trees. The narrow cleared areas nearly always extend in straight lines up and down the slope of the land to form channels for soil-wash during the heavy rains to which the island is subjected.

In the older plantings, the trees were almost invariably damaged by very bad tapping in the past. Somewhat better tapping is now practised in younger areas, but often the trees are tapped while still too young. As most of the tapping is done on a share system, the tappers endeavour to obtain as much latex as possible, regardless of damage to the bark, consequently the bark renewal is very poor.

A certain amount of new planting is in progress, chiefly by Chinese owners, but, as with coconuts, there is a notable absence of modern methods of cultivation.

Owing to the neglected state of much of the rubber and the high number of untappable and undersized trees, it is difficult to assess yields, but it is highly probable that, over considerable areas, a computed yield of 56 lbs. per acre, per annum, may not be subject to a very wide error.

There are 1,900 acres under padi cultivation. The 'sawah' or flooded lands appear to possess suitable soil for this crop: they are not irrigated so that all the padi is dependent on rain. The rainfall is ample for the requirements of the crop which is cultivated in the rainy, or north-east monsoon season. Little attention is given to drainage. Sea-water occasionally enters the lower portion of the largest padi area rendering the soil unsuitable for cultivation.

Preparation of nurseries and lands is not commenced before the end of July or the beginning of August. The lands are prepared for planting by driving water-buffaloes round and round in the 'sawah'*. The buffaloes trample down the weeds and grass and puddle the soil. No plough or other implement is used so that the work is very slow. The best lands are said to yield 300 to 350 gantangs of padi per acre. The varieties mostly grown are 6—7 months padi of the Siam and Radin types. These varieties were obtained from Malaya by a former Resident in 1919. Their place of origin in the Peninsula has not yet been ascertained, but was probably Malacca. The names given to the varieties are Padi Siam, Padi Bajar and Padi Acheh. The former is the usual long-grained Siam type, whilst the latter resemble the shorter grained Radin varieties. In view of the fact that imported varieties have yielded well, it is likely that certain selected Krian strains would give even better returns. A small supply of pedigree seed of Radin 2 and Radin 4 has since been sent to the Resident of Labuan so that it could be sown this season with the local varieties and compared with them.

All the padi is stored in the ear in small rat-proof padi houses or 'durong'. These are well-built leaf roofed rooms placed on stout posts about 8 feet high. Each post has a broad circular protective shield of wood or iron attached to it about 7 feet from the ground to prevent rats and mice reaching the grain. Samples of padi were examined which had been stored for some months and found to be in excellent condition.

More than sufficient padi is usually produced annually for the requirements of the Kedayans themselves. The surplus is exported to Brunei and elsewhere. The Chinese population uses, for the most part, polished imported rice.

In the Rancha Rancha district and along Coal Point and MacArthur roads, where land and water transport is easy and rapid, there are numerous Hokkien and Kheh settlers growing vegetables for local consumption and export to Miri in Sarawak. The vegetables noted were 'sayur puteh,' 'bawang puteh' (eschallots), cucumber, 'trong', chillies, 'peria' or bitter cucumber; pole and bush beans, sweet potatoes, yams and celery.

The gardens are usually situated in the valleys where there is a permanent

* The system known to the Malays as 'Lanyak' in parts of Pahang where the land is very lowlying and the mud deep.

supply of water. Lands that have been abandoned to secondary growth and 'lallang' grass are quickly brought into a good state of tilth by deep cultivation, by the planting of cover crops of sweet potatoes and the application of animal and vegetable manure. It is of much interest to note how rapidly poor soil is made fertile by the intensive methods of cultivation practised by these industrious people and the excellent crops they raise from it.

The success of the trade in fresh vegetables depends, at present, on quick weekly steamer communication with the port of Miri—Singapore being too far distant. The exports are steadily increasing with the development of the oil-field in Miri. In 1924, 56 tons of vegetables were shipped, whereas in 1928, the quantity sent away amounted to 91 tons. The home demand will increase enormously if the local coal-mines are re-opened.

In former years there must have been quite a large amount of fruit grown on the island, judged by the number of old fruit trees of various kinds to be seen in different districts, but now for the greater part, sadly neglected. The decline of fruit growing is said to have been due to lack of suitable markets, but there may have been other reasons such as, for example, the attacks of insect pests and diseases.

Important fruit trees and plants which thrive well, when properly cared for, are citrus fruits such as pomeloes; free-skinned oranges of the mandarin and tangerine types, and limes, mangoes, pineapples, mangosteens and bananas.

Citrus trees grow to a large size and produce good crops of fruit when cultivated and manured. Unfortunately, with the possible exception of pomeloes, a large percentage of the fruit is damaged by the larvae of small moths known in the Philippines as citrus borers (*Prays citri*, Mill, and *Prays endocarpa*, May). The eggs of these pests are laid in the young fruit, and the larvae which develop from them feed on the pulp just below the rind. The mature insect emerges through a small hole in the rind usually before the fruit is fully ripe. As the fruit ripens, decay sets in below the place where the insect left it, and the fruit is rendered valueless for market purposes. It was estimated that quite 40% of the crops was damaged. Spraying the young fruit with an oil emulsion is said to keep the pests under control.

With few exceptions, the trees are heavily parasitized by species of mistletoe belonging to the genera *Loranthus* and *Elytranthe*. No attempts appear to be made to clear off these growths by careful pruning, with the result that the trees are slowly killed.

Many fine mango trees of common and Manila kinds were seen, but a large proportion of the fruit was attacked by a small beetle (*Cryptorhynchus mangiferae*, E.) In common with the citrus trees, the best sorts of mango were usually heavily infested with mistletoes and were badly damaged.

The large Sarawak variety of pineapples is the kind most favoured for inter-cropping with coconuts and rubber. Many exceptionally fine fruits were seen, more particularly on Pulau Da'at. A fairly large percentage was damaged by a soft rot which was not apparent until the fruit was cut open. It

is doubtful, on account of the presence of this disease, whether the variety would be suitable for export on any considerable scale.

The ordinary mangosteen grows well, and some excellent trees were seen. If the main crop of fruit is earlier or later than that in the Straits Settlements, there should be a satisfactory market for it in Singapore and elsewhere.

Generally speaking, the soils are not sufficiently fertile to carry good crops of bananas, but some good sized bunches of several varieties were noted in various places.

The sago-palm (*Metroxylon sagus*, Rothb.) grows well in low-lying places with an abundance of fresh water. There is a small local production of sago flour for export. The sago is obtained from stems of 8 to 10 years old. The excess of exports over imports for the past five years was 378 tons, or an average of 75 tons per annum. The export value was about $92 per ton. There does not appear to be any considerable area of land, other than that already wisely reserved for padi, for any extension of planting.

Tapioca (*Manihot utilissima*, Pohl.) is a favourite catch-crop in young coconut and rubber areas, and is also grown in gardens. The roots are prepared in various ways for human consumption and are also used by the Chinese for feeding domestic pigs. The crop is a very useful one for the purposes indicated, particularly as it forms the chief food used for fattening pigs for export. The yield of roots from the local varieties appeared to be fairly satisfactory.

The dried betel or areca-nut, either whole or split, finds a ready market in Singapore and there appears to be no reason, judging from the palms seen growing in Labuan, why with systematic planting and cultivation, the Island should not produce this nut for export. The palm is easily grown and the produce has only to be shelled and sun-dried in preparation for shipment.

Water-buffaloes and cattle are reared, the latter mainly mixtures of ordinary Indian kinds. The pigs kept belong to breeds usually favoured by the Chinese in Malaya. There is a small export trade, mainly with Miri in Sarawak, in these animals for slaughtering purposes. In 1928 there were exported 103 head of cattle and 97 head of pigs valued at $4,690 and $3,566, respectively.

There is no import duty in Miri on cattle and buffaloes for slaughter, but on pigs there is a heavy duty of $10/- per head which is equal to 25% or more of the value of the animal. On poultry—such as geese, ducks, and fowls—the duty is 10% *ad valorem*. In respect of pigs and poultry, it is said that the Sarawak import duties have an adverse effect on the local export trade with the result that the business is not likely to extend.

The foregoing account shows that agriculture generally in Labuan is in a very backward state due to a combination of adverse conditions. The principal causes which militate against agricultural progress in Labuan are; poor soil, the backward state of agricultural knowledge possessed by the Kedayans, the lack of expert guidance, and possibly also of capital to carry out improvements necessary for increasing their crops and to protect their property from the ravages of wild pigs and other pests.

A SERIOUS STEM-ROT OF OIL PALMS (Elæis Guineensis).*

BY

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During the last two years a stem disease of mature Oil Palms has become more and more prominent. This disease is considered to be so serious (in certain stands as much as 10% of the palms have been found to be attacked) that although the information gained up to date is rather scanty, it is considered necessary to warn oil palm planters of the existence of the disease by the issue of this preliminary report.

This stem disease has been reported from three different estates in Malaya and is usually found in palms 8—10 years old, though a record of the disease on a palm 5 years old has been obtained recently. In the majority of cases the rot appears to start in the short length of leaf-base left adhering to the trunk when the leaves are cut off for the purpose of pruning or of gathering the fruit-bunches. The leaf-bases are rotted and the fungus then penetrates into the trunk of the palm, causing a rotting of the stem tissues; this rot in the stem appears to progress rapidly in a transverse direction, so that a transverse section shows the whole of the stem tissues disintegrated, while the rot has progressed vertically some two to three feet only. The lower parts of the stem tissue from ground level up to 3-5 feet are usually quite sound, so the question of root trouble has not to be considered. The attacked leaf-bases and fibrous tissues of the trunk have a reddish-brown colour and in advanced cases the diseased tissues become spongy and wet i.e. Wet-Rot.

At this point it may be of interest to consider reports of diseases on oil palms from other countries.

There are various inconclusive records of African oil palm diseases from West Africa. A species of *Ganoderma* has been associated with a rot of the trunk; this species is closely related to a fungus common in Malaya e.g. *Ganoderma lucidum*, but the West African fungus is said to agree best with *G. tumidum* Bres. The various records from West Africa indicate that a wide-spread trunk-rot of oil palms is caused by a species of *Ganoderma*. There is some doubt as to whether one or more species of *Ganoderma* is concerned.

* The following article is a preliminary report on this important subject.

The names *G. tumidum, G. lucidum,* and *G. applanatum* have been applied, but *a priori* it would seem probable that only one species is parasitic.

A recent report from Sumatra records the finding of *Rigidoporus microporus,* Van Overeem, = *Fomes Lignosus* Klotzsch. on oil palms. The fungus attacks the soft tissue in the middle of the trunk, producing a "Wet-Rot." The thin roots are not attacked, however, and this is probably the reason why the affected palms languish for a long time before dying. A case of *Fomes lignosus* Klotzsch. on oil palms has been found in Malaya during the last year, but though there was a profuse development of frucifications on the dead tissues of the old leaf bases at the base of the stem there was no evidence to show that the fungus penetrated into the stem tissue.

Thus, the records from West Africa indicate that a very similar stem disease has been known on oil palms in that country for some years. Species of *Ganoderma* are known in Malaya by their less exact designation of *Fomes* sp. but for the purpose of this report we can consider that *Ganoderma* = *Fomes.*

A common fungus, *Fomes lamaoensis* (Murr), considered to be the cause of the well-known Brown Root disease of rubber trees, has been found closely associated with this disease in Malaya. Another fungus, i.e. *Fomes applanatus* (Pers), has been found to be associated with a diseased condition of oil palms 3-5 years old, but up-to-date, the symptoms have not been clear in these cases owing to white ant attacks at the roots. White ants are commonly found on the older diseased trees, with which *F. lamaoensis* has been found associated and it was first suggested that the fungus attack was of a secondary character, made possible by the damage previously done to the trunk of the palms by white ants. However, cases have since been found which rule out this suggestion; palms have been examined which show no sign of white ant attack, but which show the whole of the stem tissues rotted for a length of three feet, the lower limit of the disease being 2-3 feet above ground level.

In the majority of cases, the attack can be discovered by a close examination of the adhering leaf-bases which show signs of decay and on being pulled off, a characteristic red-brown colour of the diseased stem tissues can be seen. In some cases, however, no signs of decay can be seen on the outside leaf bases and no indication of the disease is observed until the palm is blown over by a heavy wind. These palms frequently retain their green leaves and generally healthy appearance, even when only a small portion of the trunk remains unaffected by the fungus. Such cases indicate the possibility of the stem tissues of the oil palm being attacked direct, without any antecedent growth of the fungus *via* the leaf-bases.

Isolations of the prominent fungi have been made and pure cultures of *F. lamaoensis, F. applanatus* and an unknown fungus have been obtained. Inoculation experiments will be commenced as soon as possible, but these must be deferred until further work on control measures has been carried out.

Preventive and Control Measures.

(*a*) Preventive Measures.

When first reported, a large number of trees were found diseased and preventive measures designed to save as many as possible of the more slightly affected trees were recommended as follows:—

Where the leaf-bases are found to be attacked, they are cut flush with the trunk of the palm, exposing the stem tissue. The cutting is continued upwards and downwards until six inches of healthy stem tissue beyond the upper and lower limits of diseased tissue is exposed. The stem tissues exposed in this manner are freely painted with a 20% solution of Agrisol. A day or two later the painted tissues are covered with a coating of coal-tar.

It has been found that the coat of tar cracks in the course of time, and fissures $\frac{1}{8}''$ wide appear in the treated stem tissue. This has been found to apply in many cases in experimental treatments with other disinfectants and experiments are in hand to find some suitable painting material which does not crack up in the manner described. It has been suggested that a mixture of asphalt and a non-drying oil may provide a better protective coating which would not crack so easily as the coal-tar covering.

The above treatment, while expensive, has been found successfully to stay the attacks on slightly affected palms, i.e. where the disease has not progressed so far as to attack the stem tissues to any great extent. It is obvious, however, that nothing can be done to the palms which have been attacked directly and which show no definite disease symptoms before being blown over. The only procedure in these cases is to cut up the trunks of the fallen palms and burn *in situ* as quickly as possible.

(*b*) Control Measures.

The foregoing indicates the obvious primary necessity of the protection of the cut ends of the leaf-bases when considering control measures. If, in future, the disease is definitely proved to be as serious as it seems to be at present, the protection of cut leaf-bases will probably become a routine procedure on oil palm plantations. In view of this, it is very necessary to consider not only the question of protective value, but also the question of costs more closely than is usually the case.

Experiments with various paints and disinfectant fluids are being carried out and while no definite results have eventuated on which recommendations can be made, the writers have reason to hope that a method of protection will be found which will not prove too costly.

With respect to the spread of the disease, well developed fructifications of *F. lamaoensis* have been found in the bottom of heaps of prunings 3-4 months old. The spores produced by these fructifications will be blown about the estate and other trees will naturally be infected. It is, therefore, most

important that on estates where the disease has obtained a good hold, an effort should be made to get rid of all prunings as quickly as possible. It is obvious too, that the material resulting from the felling of diseased trees should be destroyed as early as possible. Destruction by fire is by far the best method, but oil palm estates with peaty soil should beware of the danger of peat fires. If there is danger of peat fires, or if rain prevents firing, pits should be dug in which the debris can be placed, covered with lime, and then covered over with soil.

The fructifications of *F. Lamaoensis* are of the usual bracket shape, typical of other *Fomes* sp., dark-brown or purple-brown in colour. They are very hard and when cut in sections, show a pale-brown or dark-brown context.

Added Note.

Fructifications recently gathered and found growing from a diseased stem which had been previously treated have been identified by Mr. E. J. H. Corner, Assistant Director, Botanic Gardens, Singapore, as a sessile, hardly laccate form of *Ganoderma lucidum* (Leyss) Karst. This fungus is mentioned above in connection with the Stem-Rot of oil palms in West Africa. The fungus has been isolated in pure culture, and inoculations will be carried out as quickly as possible to try to establish the exact cause of the disease.

THE MALAYAN PINEAPPLE INDUSTRY.

BY

D. H. GRIST,

Agricultural Economist.

The consumption of canned fruits has increased enormously during the last decade, especially in Europe and America, owing in part to the wide publicity summed up in the slogan "eat more fruit," and to the greater care in the grading and packing of fruit. Of late, the publicity campaign of the Empire Marketing Board in appealing to the public to eat "Empire Grown Produce," coupled with their excellent displays and demonstrations at the large exhibitions in the United Kingdom, have had the effect of still further stimulating the trade. Malaya has benefitted in this publicity by widening her markets for canned pineapples. Although the price of canned pineapples has been somewhat unsatisfactory of late, it is felt that a reaction will set in due to the increased demand and the improvements which are undoubtedly being effected in the local canning industry.

Exports of Canned Pineapples from Malaya.

Year	Tons	Value $	Value per ton $
1919	8,228	3,286,001	412
1920	10,346	7,178,016	694
1921	21,299	6,210,383	291
1922	22,843	6,697,098	293
1923	28,605	5,874,858	205
1924	39,204	8,873,977	226
1925	43,207	8,236,824	191
1926	40,634	7,669,784	188
1927	40,134	8,296,656	206
1928	46,400	8,421,230	181
1929	58,692	9,233,732	157

Previously to 1923, the official figures of exports of canned pineapples were stated as number of cases. For the sake of comparison they are stated above in tons, at the rate of 72 lbs. per case.

British Malaya is thus the second largest producer of canned pineapples, Hawaii taking the premier position. Hitherto, Hawaii has hardly entered into competition with the Malayan product, as that country catered largely for another market and with a different grade of product. The aim of the Hawaiian canner was to market a product of first class quality. This of necessity could only be achieved by rigid selection and a large amount of waste, resulting, as might be expected, in a comparatively expensive article. Malaya, on the other hand, set out to place a cheap canned fruit on the market. This was rendered possible by the fact that pineapples were looked upon as a catch crop on Chinese rubber plantations and by the incidence of cheap labour and cheap factories of a temporary nature, situated in close proximity to the growing crop, thus reducing to a minimum all freight charges.

For the above reasons, it was possible for Malaya to market a product which, if not perfect as far as grade was concerned, was a canned fruit of good quality, delicious in flavour, and the cheapest canned fruit on the market. Thus, it automatically became the poor man's dish and found a ready market in the United Kingdom.

The above remarks regarding grading must not be taken too literally. A considerable amount of grading was necessary—and is inseparable with pine-apple canning. It is estimated that only one-third of the total weight of pine-apple arriving in the factory leaves it as the finished canned product.

During the past two years, efforts have been made to improve the quality of Malayan pineapples, if possible without increasing the cost of production. That such efforts have been successful is shewn by the following abstract from an official report of the Malayan pineapples exhibit at the Imperial Fruit Show, Birmingham, 1929.

> "One very gratifying feature of the Show was that numerous retailers, while mentioning that in years gone by Singapore pineapple had enjoyed none too good a reputation as to grading and quality went on to state that the improvement recently made in these respects has been most marked; and there were some who offered the opinion that the best brands of Malayan fruit—though not all, of course—can now compare on level terms with the product of Hawaii".

The United Kingdom market is at present held by the Malayan product, and it is proposed not only to hold this market by maintaining the quality, but to extend it to other countries, and to other classes of consumers. It is estimated that 86% of the canned pineapples consumed in the United Kingdom are the produce of the Overseas Empire, while Malaya's share of this is over 80%.

Two features of Malaya's trade in canned pineapples may be noted in this place—that of situation of the factories and policy regarding affixing labels.

At one time, practically all the pineapples were grown on the Island of Singapore, or were grown on the neighbouring mainland of the State of Johore and the fresh fruit despatched to the factories in Singapore for canning pur-

poses. Singapore was also, of course, the port of shipment to Europe; consequently the produce was known as the "Singapore" canned pineapple. Of recent years, however, owing to the growth of the trade, the absence of suitable and sufficient areas on the Island, and to the development of rubber cultivation on the virgin soils of Johore, the production of pineapples has become a more distinctive feature of Johore agriculture than that of Singapore, until at the present time there are more pineapple canning factories in Johore than in Singapore. Further, a factory was also opened in the State of Selangor. While practically all shipments were effected through Singapore, it was no longer correct to presume that the goods were the product of Singapore, so that the term "Malayan Pineapples" has gradually found favour as being a more accurate description. Singapore has not entirely lost her personal interest either as producer or canner. There is still a considerable area under the crop and several factories on the Island.

The question of labelling the tins is one of great importance in the policy of marketing Malayan pineapples. It was previously the custom for the local product to be exported without label, and for the labelling to be done in the United Kingdom. One has little information as to the ultimate labelling of such goods, but if the Malayan product is to be an important factor in the market it is desirable that no secret should be made of the country of origin. It is possible that the country of origin was in some cases suppressed owing to the not altogether flattering opinion of the Singapore product which was held in some quarters. During the past three or four years, the policy regarding this subject has entirely changed. It is now customary for the labels to be despatched from the United Kingdom and affixed to the tins in this country. In almost every instance such labels state that the contents are the produce of Malaya or of Singapore. There are probably two reasons for this change of front; it is cheaper to affix labels in this country than in the United Kingdom, where high wages are the rule; and secondly, by admitting the country of origin, the distributor is taking advantage of the very valuable publicity campaign at Exhibitions, at which Malayan pineapples are advertised and their preparation for the table demonstrated.

The future of the industry is of some concern to British Malaya. The exports have grown enormously, and the market is extending. On the other hand, it must be realised that practically the whole area under the crop is interplanted with rubber, which will entirely replace the pineapples in the course of about six years. The area under the crop in Malaya is between 40,000—50,000 acres, of which probably less than 5,000 acres is of pineapples treated as the main crop. It follows, therefore, that the maintenance of the canning industry depends upon new areas being opened up and planted with pineapples to replace the old areas as they drop out. This replanting depends, at present, almost entirely on the planting up of new areas with rubber, in which pineapples is to be treated as a catch crop. It is reasonable to anticipate that the programme of planting up new areas with rubber will proceed at a less rapid rate than

hitherto, on account of the present slump in rubber. Does this spell the curtailment of the cultivation of pineapples and the gradual loss of markets on account of shortage of supplies? Unless there is a change of policy regarding the planting of pineapples, it is possible that Malaya will lose her pre-eminence in this trade.

The cultivation of pineapples as a sole crop is quite possible provided suitable provision for fallowing areas and a programme of manuring is given consideration. The great advantage of this system would be that the factory and the machinery might be established of a more permanent nature than those general at the present time. This would react favourably on the cost of production and the maintenance of the quality of the finished product.

In order that those interested in this aspect of the subject may have at hand the outlines of the experience of pineapple cultivation in this country and elsewhere, it is proposed in the next number of this Journal to state the present methods of cultivation and canning of pineapples in Malaya, contrasted with methods obtaining in Hawaii and South Africa.

CO-OPERATIVE RUBBER SOCIETIES AMONGST SMALL-HOLDERS.

BY

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Agriculturist (Rubber).

Seconded to the Co-operative Societies Department.

Co-operative marketing, or in other words, the organised production and sale of all crops, is a matter of world-wide importance at the present time; in particular, the co-operative marketing of rubber on somewhat similar lines is a vital economic question of to-day for Malaya and the British Empire. When the co-operative manufacture and sale of rubber is firmly established amongst small-holders, it is hoped that it will assist in any proposals for the co-ordination of the industry as a whole. The immediate objective, however, is to improve the methods of cultivation and the grade of rubber manufactured in the native holdings.

Mr. C. F. Strickland in his report on Co-operation in Malaya* states:—

> "There is no reason to doubt that the factories can confer a direct economic benefit on the small producer, can establish themselves on a sound footing and pay off whatever debt it is necessary to incur for building expenses, if the producers will remain loyal to them for a period of years. The question is whether the economic inducement will be sufficient to hold the loyalty of a producing class, in whose lives economic values do not play so large a part as in other countries. The factories will offer this advantage over the alternative scheme of selling latex jointly to a big Estate, that, while the latter method provides only a safe market, the former encourages the Malays to build up a local institution which they may regard as their own and of which they may feel proud. If this idea appeals to them, I think that the rubber societies may flourish; they may expand with reasonable rapidity, which will depend on the careful guidance of the first two or three societies. I advise that no undue haste be used in their formation."

Co-operative rubber societies will provide members with more time for development of other sources of income such as fruit and vegetable cultivation, short duration crops, poultry farming, etc. They will, in addition, prove centres for lectures, demonstrations and serve generally as channels for the dissemination of information.

The acreage under rubber on holdings of less than 100 acres in the Federated Malay States as recorded in statistics relating to rubber compiled by the Deputy Supervisor of Rubber, amounted to 534,937 acres in the year 1928, while the total acreage under rubber at that time amounted to 1,433,056 acres.

* Federal Council Paper No. 26 of 1919, paragraph 4.

It will be seen from the above figures that small holdings of less than 100 acres represent approximately one-third of the total acreage of rubber in the Federated Malay States.

Before it was possible to determine the suitability of any particular area as a centre for a co-operative rubber factory, it was essential to make a detailed economic survey of all the holdings and their ownership, state of cultivation, methods of marketing, mortgage indebtedness, etc. and an appreciation of the problems likely to be encountered.

The preparation of draft bye-laws required special care in the absence of any local experience as a guide or precedent. Draft bye-laws were ultimately prepared and a special conference was held to consider their suitability and where necessary make required alterations. Senior officers of the Co-operative Societies Department attended the conference and had the benefit of hearing the views of Mr. Strickland, I.C.S. The bye-laws were published in English and Malay, the former being distributed to all senior Government officers throughout the Peninsula and the latter amongst Malays where propaganda was being conducted for the formation of societies. The Malay translation was published in *Warta Perusahaan Tanah,* the quarterly publication in Malay issued by the Department of Agriculture, S.S. & F.M.S.

To secure interest in the scheme amongst the small-holders in the early stages of devlopment and to obtain their confidence, it was essential to devote a great deal of time to each particular centre. In order to expedite matters, two Malay Co-operative Officers were detailed to secure the closest contact with the people concerned.

The Organisation Officers at headquarters took charge of five rural credit societies in areas in which rubber organisation work was in progress. This is desirable as there is considerable co-relation between the two types of societies.

The following plan of organisation was adopted and will be adhered to subject to the dictates of future experience. Rural credit societies were used as agencies for spreading information as to better methods of cultivation, collection and preparation of rubber and acted as a stepping stone for the formation of co-operative rubber societies. The assistance of local headmen was also enlisted. When sufficient interest had been aroused amongst the native holders, public meetings were held at which District Officers were occasionally present. At these meetings, the scheme and bye-laws were explained in detail and questions were invited. When sufficient support was forthcoming, provisional organising committees were appointed to enrol members, to schedule the acreage and amount of rubber affected and to secure signatures under the binding agreements prescribed in the bye-laws.

Whenever the total area owned by the prospective members exceeded 200 acres, application was made for registration under the Co-operative Societies Enactment of 1922 and a permanent committee of management was appointed with a President and Vice-Presidents, who were usually the Collector of Land Revenue, Assistant Collector of Land Revenue or District Officer and Assistant

District Officer, as the case may be. Malay officers assisted the members of the Committee to collect share capital and entrance fees.

At several centres, small-holders have exhibited great interest in the scheme, and at three centres in particular have expressed a desire to establish factories at the earliest possible date.

One of the chief difficulties encountered has been the collection of share capital from members, owing to the very low price of rubber which prevailed throughout the year 1929. In view of this, it was obvious that in most localities, a considerable proportion of the capital would have to be borrowed if societies were to begin operations at an early date. The local banks, the Planters' Loans Board and certain co-operative thrift and loan societies are prepared to lend money at a reasonable rate of interest. The members themselves are offering their title deeds as security for the borrowed capital. The repayment of the capital will be effected by a deduction of two cents per lb. from the money realised from the sales of rubber as prescribed under Bye-law 29. This fund should also ultimately provide for costs of supervision of the societies as required by the Registrar and provided in the Bye-laws.

Local rubber dealers have been interviewed regarding the purchase of the rubber and no difficulty in marketing in bulk on good terms is anticipated.

A system of book-keeping specially adapted for the use of societies has been evolved and specimen books have been printed.

Plans and specifications of the proposed buildings have been prepared. The factories will be capable of dealing with a crop from about 500 acres of mature rubber and the possibility of extension has been allowed for, as it is anticipated that many more people will become members when the factories are at work.

Three societies have been registered, the particulars of which are as follows:—

The Ulu Gombak Co-operative Rubber Society, Ltd., was registered on the 23rd August, 1929. The area of operations is in the Mukim of Setapak, 8¼ mile Bentong Road, in the neighbourhood of the village of Ulu Gombak, Selangor, and is bounded by a radius of one and a half miles from the 9th mile stone. Within this area there are approximately 1,000 acres of mature rubber and further areas are adjacent. The present membership consists of 65 Malays owning approximately 205 acres of mature rubber.

The capital required for buildings, plant and machinery is estimated at $3,500. The paid-up capital to date amounts to $615.00 of which $600 has been paid to the Society's account at the Hong Kong & Shanghai Bank, Kuala Lumpur. Further subscriptions are being collected. Arrangements have been made to borrow the balance required up to a maximum of $3,000 at 8 per cent. per annum, from the Malay Officers' Agricultural Department Thrift & Loan Society, Ltd. A leading committee member has offered to place his title deed to a valuable holding as security. It is estimated that this capital will be repaid in about two and a half years on present membership, but the period will be reduced if the membership increases.

The site for the factory is situated at the 9th mile, Bentong Road. Application was made for the site on the 14th August, 1929. In December, the Selangor State Council approved of excision of the required area from the Malay Reservation, in order to legalise the position. The demarkation survey and the grant of the title may be expected to be completed early in 1930. Tenders for the erection of the buildings have been received from contractors at reasonable rates. The factory and smoke house with which it is proposed to commence will cost on contract $2,200 and the balance of the estimated capital is regarded as ample to complete the purchase and installation of necessary equipment for the factory, development of site and provision of water supply, etc. This plant will be large enough to cope with a production in excess of that anticipated from the present membership.

The Dusun Tua Co-operative Rubber Society, Ltd., was registered on 23rd August, 1929. The area of operations is in the Mukim of Ulu Langat, in the neighbourhood of the Dusun Tua Sanatorium, Selangor. In this locality there are large areas of small holdings of rubber. The present membership consists of 47 Malays, owning approximately 229 acres of mature rubber. In the case of this Society, the estimated capital requirements are similar to those of the Ulu Gombak Society quoted above. Members have paid up share capital and entrance fees to the amount of $570, which has been deposited in the Society's account in the Hong Kong & Shanghai Bank, Kuala Lumpur. Further share subscriptions are being collected. It is proposed to collect and retain as security, titles from those members who are unable to pay up the subscribed share capital. The repayment of the capital will probably be accomplished within the same period of time as that estimated in the case of Ulu Gombak Society. A site for the factory, on the road side, in the quarry reserve opposite the Sanatorium was applied for on 14th August, 1929. This application was refused on 24th September, 1929. Application was made on 29th October for an alternative site comprising two pieces of land situated at a distance of about 100 yards from the road in rear of the land first applied for. The two pieces of land are one-fourth acre of lot 590 Mukim of Ulu Langat and a portion of the access reserve adjoining it. The owner of lot 590 has expressed his willingness to sell the one-fourth acre at a price of $100. As in the case of the Ulu Gombak Society, the Selangor State Council in December approved of excision of the required area from the Malay Reservation. The matter of tenders and contractors for the buildings is receiving attention.

The Bendang Siam Co-operative Rubber Society, Ltd., was registered on the 17th January, 1930. The area of operations commences at the $6\frac{3}{4}$ mile from Taiping on the Sitiawan Road in the State of Perak and extends to the 10th mile covering an area about one mile wide on either side of the road. Within these boundaries there are approximately 1,500 acres of mature rubber. Two provisional sites for building purposes have been selected near the middle of the block.

Transport would be relatively simple as the main Government road runs through the middle of the area.

In this area there are two Rural Co-operative Credit Societies through which propaganda work is being continued. Most of the members of the Rural Co-operative Credit Society who own rubber land have become members of the Bendang Siam Co-operative Rubber Society, Ltd. Up to date, 90 people have become members and signed the binding agreements.

The area of rubber owned by the members amounts to 316 acres. The members have all joined since November, 1929, and the progress made in respect of membership up-to-date is so satisfactory that it is anticipated that many others will join in the near future. At a meeting dated 6th December, 1929, those present unanimously agreed that no sums should be borrowed, but that all the required capital should be subscribed by members. Share capital is now being collected and since 26th November $293 has been paid up, but with the price of rubber at its present figure, it will take some time before it is possible for all the share capital to be forthcoming. The residents are mostly Patani Malays and are permanently settled in the locality. From observation made they would appear to be relatively free from debt.

Further propaganda for the formation of co-operative rubber societies is in progress in the following districts:—

Batu Kurau.—Batu Kurau is situated about 15 miles from Taiping, Perak on the Ijok Road, where there is a relatively large area of Malay-owned rubber. So far, 60 people, owning approximately 200 acres of rubber, have signified their intention to form a Co-operative Rubber Society.

Temoh Station, Perak.—The approximate area owned by members who have expressed willingness to join amounts to 185 acres.

It is intended to concentrate upon the above-named societies as object lessons for Perak and Selangor, but to continue propaganda in other localities.

RINDERPEST.*

BY

R. MACGREGOR,

Government Veterinary Surgeon, Pahang West.

In Malaya, Rinderpest is called Hawar Kerbau or Hawar Lembu. In Ceylon, Narakali. Bengal, Boshonto; in Europe, Cattle Plague or Cattle Typhus.

This cattle disease, which is apparently frequently introduced from countries adjoining the northern boundaries of the Malay States, has caused extensive loss to Malaya through the death of nearly all buffaloes which become infected. In recent years, the outbreaks have been frequent and the reduction of the numbers of buffaloes from this cause in padi growing areas has become very serious; so much so that the acreage under rice in districts where the disease has been rife has been steadily declining. The disease is not always present in Malaya, outbreaks occur chiefly in quarantine stations in cattle imported from Siam and sometimes from India. The source of infection of some outbreaks cannot definitely be traced; there is often a suspicion that cattle have entered the States and have avoided quarantine.

Wild pigs are sometimes blamed for carrying the disease as dead pigs have been found in districts where a sudden outbreak has occurred.

The movement of infected animals, or animals in an incubation stage or contact animals is perhaps the chief method of spread. The buffalo is the most susceptible Malayan domestic animal, in about 98% of infected animals of this breed the attacks proves fatal. The Deli or Murra milking buffalo is said to be intermediately susceptible between the Indian oxen and the Malay buffalo.

The ox is not so susceptible, but the local breeds are not so resistent as the imported Indian bullock; mortality of local stock may be as high as 90% while only 30% of Indian imported stock may succumb to the disease. Sheep and goats are said to be immune from natural infection.

Chinese-owned buffaloes are reputed to be more immune to rinderpest than those owned by Malays, and if attacked they are said to have a greater resistance to the disease. Records collected by the Veterinary Service do not support either contention; but because these animals are usually stall-fed and not allowed to mix with wandering Malay buffaloes, or become associated with the wild pig, they often escape contact with affected animals.

The wild pig is considered to be very susceptible and becomes an important agent in transmitting the disease from one place to another and also for maintaining the disease.

Symptoms.—The animals have inflamed eyes, with at first a watery

* Abstracted from an Official Memorandum by Mr. R. Macgregor, Government Veterinary Surgeon, Pahang West.

discharge later becoming thick and white. If the lungs are affected, the animal may have a cough; the muzzle is dry and cracked and the breath has an offensive smell; the temperature may be 106° or more. If the animal survives for two days, the mouth lesions become pronounced and diarrohea occurs, the dung being sometimes bright red, but generally black and foul smelling. Occasionally, black urine is passed. In fatal cases, the temperature falls rapidly. Some animals survive until the seventh day, but they often later have a relapse and die.

A redness may be noticed on the paler areas of the skin in the early stages, animals that survive to the later stages may have a dry, cracked and very red skin. A post-mortem examination after the second day will show that the alimentary canal is ulcerated.

Control of the Disease.

In Malaya, no method has been tried which has proved to be entirely satisfactory for immunising stock against the attacks of rinderpest. Some successs has apparently been obtained by inoculations and vaccinations. Such preventive methods are often very expensive and there is some doubt whether the actual inoculations have been the cause of immunity of treated animals. Investigators in Tanganiyika colony and the Philippine Islands claim to have had good results with one or more methods of inoculations and vaccinations. There is a danger of introducing other diseases, as it is difficult to provide a virus free from other infection; also the reaction to rinderpest might revive old infections of various blood parasites in treated animals.

Mr. S. L. Symonds, late Veterinary Surgeon, Selangor, stated that "Rinderpest is not indigenous to Malaya, but is frequently imported from Siam and India, under these conditions efficient quarantine must always remain the chief safeguard against this disease; the danger lies in cattle crossing boundaries into the States and avoiding quarantine".

If an outbreak occurs in a district, the quarantines order that—"all cattle shall be confined to their owners' premises means that cattle shall be kept adjacent to the owners' house, and that calves, or cows must not be permitted to ramble about at night."

Great care must be exercised by owners that they do not carry the disease to neighbouring holdings on their clothes, feet, or the wheels of vehicles.

The only way to stamp out the disease is to carry out the rigid quarantine regulations as laid down by the British Resident. The serious losses incurred to a district by an outbreak warrants the levying of heavy fines on any person breaking the quarantine regulations. Several outbreaks during the past few years have continued for months, gradually spreading from one place to another, until exemplary fines were imposed on owners for not complying with quarantine orders. As soon as the owners realised that the orders had to be obeyed and not evaded, the disease gradually died out in each case.

Principal Medical Officer's Circular 25 of 1928.

Rinderpest is an acute infectious, contagious febrile disease chiefly of cattle caused by ultra-microscopic virus. In England the disease is known as Cattle Plague.

The disease has not been indigenous to Malaya for many years, but sudden outbreaks occur from time to time and in many cases the origin of the infection cannot be satisfactorily traced. (These are apart from the outbreaks that often occur in cattle quarantine stations amongst imported cattle). The disease affects cattle, oxen and buffaloes—and is of great importance to the Malaya farming population as the Malayan buffalo is exceedingly susceptible and the mortality is very high, 98 to 99 per cent. In the outbreak in the Tampin and Kuala Pilah districts of Negri Sembilan in 1926 only 12 buffaloes recovered out of 1,156 affected, while the total loss in buffaloes, including those slaughtered for food or sold to butchers was nearly 3,000. In many kampongs all the buffaloes were lost.

Experience shows that the only reliable method of control of the disease in this country is strict quarantine and prohibition of movement of affected and contact animals, and success depends on the degree to which this is obeyed or can be enforced. A recent report from Tanganiyika Territory also emphasises the importance of rigid quarantine measure for controlling the disease. In Tampin district in 1926, quarantine was generally well observed and the disease held in check, and in one or two places was restricted to the originally affected animals. The spread from holding to holding, when such did occur, was traced to illegal movement of animals or attempt to conceal the disease. This movement of animals was generally deliberate. In parts of Kuala Pilah district, quarantine was evaded as much as possible, any excuse being offered and the disease persisted for six to eight months, until in many small holdings there were no more buffaloes left to contract the disease. On several occasions, the introduction of an infected or even a contact buffalo into an unaffected holding has resulted in the loss of all the buffaloes of that homestead.

To make quarantine really effective it is necessary that, whenever a quarantine order has been made by the Resident on account of the rinderpest, breach of such order should be looked on as a very serious offence and exemplary fines or other sentences imposed. It is certainly a more serious offence than merely "straying cattle." In the Raub District of Pahang in 1928, after the disease had been in existence there for nearly eight months, a few exemplary fines were imposed in August instead of the previous small fines: the disease cleared up in September and in November the district was cleared free of Rinderpest.

ABSTRACTS.

CO-OPERATIVE MARKETING BY SMALL-HOLDERS.

The Year-Book of the Department of Agriculture, Gold Coast, contains an article* which embodies the views of that Department on the subject of organising the sale of cacao from small holdings. The difficulties that face the Gold Coast administrators in the marketing of some 220,000 tons of cacao, being the annual crop from about 900,000 acres obtained from 150,000 owners and marketed in 1,200,000 small lots, find a close parallel in Malaya with its enormous area of rubber and coconuts owned by small-holders. The following resume of the position in the Gold Coast and the scheme of marketing the cacao crop is of interest in view of the scheme inaugurated in the Federated Malay States for the establishment co-operative rubber factories, an account of which will be found in the present number of this Journal.

In the Gold Coast, there are 150,000 owners of cacao land, the average area owned by each being about six acres, with an annual out-turn of $1\frac{1}{2}$ tons of cacao each. Further, the crop from each holding is reaped four times annually, so that 1,200,000 lots are reaped, prepared and sold. It is entirely a peasant industry, the bulking of produce from several farms being rarely practised. Consequently, there is considerable lack of uniformity in the product. Defects are partly seasonal, but in general they arise from inefficient methods of reaping, fermenting and drying. Defects and lack of uniformity in produce are characteristic of unorganised peasant industry in any country and are not peculiar to the Gold Coast. The effective remedy—as has been introduced into India, Ceylon, Mauritius and Malaya— is co-operative preparation and co-operative marketing, and it is applied in progressive countries by the private enterprise of the farmers themselves. The effect of lack of organised methods of preparation and marketing is shewn by the fact that the Gold Coast producers lose from £7 to £10 per ton over organised competitors in other countries. To abolish this difference it does not suffice merely to improve the quality. The industry must be organised in such a manner that the manufacturer can make contracts ahead with complete assurance as to good quality and uniformity.

The effect of individual preparation and marketing on local prices is even more serious. It brings into being the petty itinerant buyer and the broker as the merchant cannot deal individually with each of the thousands of small holders, and this in turn leads to the system of advances to producers. The whole task of financing the crop and its subsequent treatment till it is shipped is then left by the farmer to the merchant. This unsatisfactory system is equally against the interests of the producer and the merchant. From the point of

* Paper No. 1 "Local Cacao Prices and the Standardisation of Quality". Year-Book 1928, Department of Agriculture, Gold Coast. Published 1929.

view of Government, the present position regarding preparation and marketing is unsatisfactory because there is increasing friction over questions of price and because quality is becoming more and more a factor determining prices in the world's markets. It is held that the radical problem is not merely the standardisation of quality, but it must attack the radical problem of the farmer's finances.

The Gold Coast Department of Agriculture planned a co-operative unit of seventy-eight farmers for the preparation and marketing of their crop. The result of this experiment in co-operation was that not only were all intermediate charges cut out, but the first lot sold at £3.14s. and the second lot £4.12.6d. per ton above the local broker's price. Further capital was provided, the farmers subscribed (in shares of 1s. each) £160 in a fortnight. This enabled spot-cash to be paid for each lot brought in and overcame the tendency towards intermediate sale. Such a system finances the farmer, especially during the winter crop, is effective in improving the quality of the product, stabilises and improves the relations between farmers, merchants and Government and finally reduces waste of time and money.

The above is an instance of a small primary unit. The second step is the formation of larger secondary groups of units. Secondary groups should not be formed by fusion but by confederation of primaries, because the primary must be small enough for members to know each other intimately, and for methods of book-keeping and accounting to be simple. The assumption of an Agricultural Bank, entirely capitalised by Government or by some other body external to the farming community is unsound for three reasons: firstly, it would encourage rather than discourage thriftlessness. Secondly, adequate security is not obtainable from individual small farmers under present local conditions. Thirdly, no central bank can hope to fill the petty, recurrent needs of individual small farmers. In an effective system, primary societies fill petty personal needs, secondary federations handle joint needs, and group of secondaries are real, living and effective banks.

There are reasons for believing that the system considered in the Gold Coast would grow rapidly, too rapidly for safety in the early stages. Very rigid, thoughtful control would have to be exercised by Government. If the scheme became a complete one, covering the whole cacao crop, the number of primary units would not be less than 1,500 and two lines of control would have to be established. Inspection and certification of produce would be performed by the Department Inspectorate, supervision of books and accounts by the Economics Division.

WILT DISEASES OF COCONUT PALMS IN TRINIDAD.*

In these papers, attention is drawn to diseases of the Coconut Palm in the West Indies which terminate in a rotting of the bud. The diseases mentioned are:—(1) true Bud-rot, primarily caused by a fungus (*Phytophthora palmivora* Butl.), in which the bud and the central spear of unfolded leaves are first attacked, (2) "Red Ring disease", caused by eelworms, in which the older leaves are the first to wither, although the final stage results in a decay of the bud, (3) "Tapering Stem Wilt or Yellow Leaf Wilt", and (4) "Bronze Leaf Wilt" which forms the main subject of the papers.

If the three lowest and oldest leaves of a palm become discoloured bronze, coupled with an increasing yellowing at the tips of the next two or three leaves, the palm is probably affected by Bronze Leaf Wilt or Red Ring disease. The stem tissues however are not as a rule discoloured in the case of Bronze Leaf Wilt disease, but if eelworms are responsible the discolouration is very evident. As Bronze Leaf Wilt disease progresses, the yellowing of the leaves extends to the still younger leaves. When only four to six of the lowest leaves are discoloured the tender crown tissues are healthy, but later, a bacterial rot sets in at the base and in the folds of the still green leaflets of the central spear of leaves. The rot later extends downwards into the cabbage, and develops considerably before the central spear of leaves changes colour. In the later stages of the rot they wilt, turning a dull greyish-brown colour, and fall over at the base. A shedding of green nuts takes place, at the same time or slightly in advance of the discoloration of the leaves. Similarly, especially in the lower ones, the swords or spathes turn brown, from the tips backwards towards the base, slightly in advance of the discoloration of the tips of the leaves in the axils of which the swords are borne.

No root-invading organism has been associated with the disease, which is considered to be due to "drought" i.e. to a combination of factors, including the soil moisture factor, which is to a large extent dependent on the tilth, texture, humus content, etc., of the soil, together with unsuitable, and in many cases definitely injurious, agricultural operations. There is also the impression that possibly waterlogging will bring about the same result, but the writer considers it advisable to prove this by further observations and experiments before any further statement can be made. The disease is worse on low-lying, badly drained land, and on lands with a permanent water-table four feet or so below the surface of the soil. In Trinidad, however, on certain coconut areas, the land becomes waterlogged in the wet season owing to a heavy subsoil. In such soils, the effective root system is confined to the top nine inches or one foot of soil. In the dry season, this top soil becomes excessively dry within a few weeks and Bronze Leaf Wilt sets in at a later date. In soils of this nature there is

* H. R. Briton Jones. Part I. Supplement to Tropical Agriculture, May 1928.
Part II. „ „ „ „ Dec. 1929.

little or no upward movement of the sub-soil water. There is also a definite seasonal variation in the incidence of the disease which is correlated with wet and dry seasons.

The disease has been reproduced experimentally in healthy palms, by digging a trench around the palms one foot wide, three feet deep, and at five feet distance from each palm. Other palms were treated by digging the soil on one side to a depth of three or six inches, thus cutting the root system. In a fortnight or three weeks the earlier symptoms of Bronze Leaf Wilt appeared on the trenched palms and appeared, on the palms treated by digging, on the treated side only.

Three palms suffering from the disease were watered periodically during the dry season from February to May. One of the palms was badly affected (10 bronze yellow leaves), but the other two were in an early stage. In these two palms the progress of the disease was arrested by the month of April, and they were healthy and cropping well in December. The badly affected palm died in May.

Subsequent observation shewed that a certain percentage of palms recover naturally, but the recovery is not necessarily permanent. Some palms may recover several times but in a very large number of cases the palms die.

Control measures are discussed under two headings, (1) "preventive measures" to be applied to young plantations and to those lands not yet planted with coconuts and (2) "palliative measures" to be applied to established plantations in a cropping condition. The ultimate aim of these measures is to obtain improved soil conditions so that paying crops of coconuts can be secured. The question of drainage is discussed at some length, and it is pointed out that drainage must not be overdone. Drainage systems on coconut areas in Trinidad are complicated by the fact that much of the land was formerly under sugar cane, and it is still customary, for the first few years, to grow sugar cane as a catch crop. The writer outlines a change of drainage system which will bring the palms more into the centre of the bed, and in which soil, weed brushings and lime are placed in the old drains, and the reformed beds are round ridged to ensure efficient running off of the water.

Cultivation of established coconuts is not recommended in Trinidad for fear of root injury. The writer favours covering the land with a vegetable mulch in the dry season by cutting the weeds which are allowed to grow in the wet season. Weeds assist in getting rid of excessive soil moisture in the wet season, but should not be allowed to grow in the dry season as they further reduce the available moisture. To replace weeds by a cover crop, on established plantations, is considered to be inadvisable since it would mean cultivation.

The writer also considers that coconut palms in Trinidad are planted much too close, generally at what appears to be just about half the proper distance apart, and recommends that every alternate palm should be cut down in order to provide more root room for the remainder. "Taking the effective root range to be one foot in depth, and the average width of the beds and distance of

planting to be fifteen feet, it follows that the coconut palm has 225 cubic feet of poor soil from which to obtain its nutriment and water supply. It is no wonder, therefore, that the palms take fifteen years to produce a crop, and that, as a result of its production and the additional strain on the root system the palms die from Bronze Leaf Wilt." The control measures suggested by the writer are being tested on a financial basis on a group of estates in Trinidad, to see if control of the disease is possible on an economic basis. Research work on soils is required to work out the technique, by means of which it would be possible to decide what lands can and cannot profitably be planted up with coconuts.

In Malaya, Sharples* has obtained evidence that on well run estates, palm diseases which may end in a rotting of the bud are largely due:—(1) to the effect of lightning strike or (2) are influenced to a certain extent by the presence of a fungus (*Marasmius palmivorus*) on the leaf bases and strainers.

Actual lightning strikes have been observed and the after-effects were similar to those found in other cases where lightning was suspected. A recent paper entitled "Lightning" by Dr. G. C. Simpson, C.B., F.R.S., published in a supplement to "Nature" Nov. 23rd, 1929, gives an interesting account of the mechanism of thunderstorms. Dr. Simpson's conclusions that discharges from positively charged clouds are frequent but comparatively weak, while those from negatively charged clouds are infrequent but strong, make it possible to offer a reasonable explanation of the sudden appearance of lightning strike symptoms in large areas, and small and scattered areas, of coconut palms.

Where palms are grown in Malaya on poor soil, or where they are given bad treatment, they may develop external symptoms similar to those described for Bronze Leaf Wilt in Trinidad—which is only to be expected. In addition, leaf fungi such as *Pestalozzia palmarum* and various *Ascomycetes* may become prominent. The effects of lightning and of *Marasmius palmivorus* have been observed on areas where soil or growth conditions could not be considered in any way responsible.

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* Sharples, A. Palm Diseases in Malaya. *Malayan Agricultural Journal*, Vol. xvi, Nos. 9 & 10, 1928.

SOIL MANAGEMENT:

Particularly with Reference to Coffee Cultivation.*

A soil rich in plant food is not sufficient in itself to supply the essential factors for plant life.

In an analysis of any crop, moisture is always first determined and is always present to a greater or less degree, but the amount of water used by the crop is not measured entirely by the amount contained in the plant at any given time. Investigations in the field and in culture solutions have shown that the root hairs of the plant are constantly absorbing water which ascends through the roots, stems and branches to the leaves from which it is evaporates into the air. The amount of water which passes through a crop in this manner is enormous, amounting to roughly 500 lbs. for every pound of dry matter produced. This water acts as a vehicle for mineral plant foods, controls the temperature of the plant and is all-important in plant processes. In a climate like this, where bursts of rain are followed by more or less long dry periods, it is particularly important to conserve the water supply. Unfortunately, the elements are still beyond our control and farming continues to be a huge gamble, we are told; but it is interesting to realise that we can always increase the odds in our favour by skilful soil management.

Another important factor is air. A water-logged soil is just as unhealthy for most plants as an extremely dry one, because it sets up rotting in the roots and eventually kills the plant. Thus, the ideal soil is one which is highly retentive of water and yet never water-logged.

Such a soil must have a high percentage of pore space, that is a granular soil. A powdery soil has a low pore space and is very subject to wash and erosion. These two factors, water and air, are just as important as plant food, which will be considered last because it rarely consists of more than five per cent of the crop. The main food factors are nitrogen, phosphorus and potash. There are comparatively few soils which do not contain sufficient of these materials for the crop, although there are many soils on which dressings of either or all of these materials give an increased yield. The reason is, that in many soils, these materials are not available, meaning that they are not in a fit state to be absorbed by the plant roots. Good soil management supplies the remedy of these cases, as will be seen later.

This leads to the subject of the economics of manuring. One can only decide whether a manure will pay by carrying out field experiments. Try the manure on a few lines and leave others as controls and take yields and costings

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* Abstract from a paper read at the Annual Conference Uganda Planters' Association, June, 1928, by W. S. Martin, M.Sc., Ph.D., A.R.C.S., D.I.C., A.I.C., Agricultural Chemist, Department of Agriculture, Uganda Protectorate. Circular No. 21, Department of Agriculture, Uganda Protectorate.

as accurately as possible. Such experiments must be carried out for the particular estate because the response of different soil types to manure varies.

Although it is essential to have plenty of mineral plant food latent in the soil particle, a relatively small quantity available at a given time is sufficient for the plant's needs, something of the order of fifty to one hundred parts per million of the soil solution. It is the aim of good soil management to render available the plant food material already present in the soil before thinking of artificial fertilisers.

The majority of the plantations in Uganda have been opened up on elephant grass land. Such land has usually a deep soil of good structure. The first few crops taken off this soil are invariably good, but fall off gradually. An examination of soil from such an area may show that it is a mixture of good crumbs of varying sizes, or it may be fine and dusty. The latter state is chiefly the result of clean weeding, necessitating frequent hoeings which continually add to the quantity of pulverised material. The fine dusty soil has a minimum of pore space and water-holding capacity. In a wet season it easily becomes water-logged, inhibiting the growth of the tree owing to lack of air; while early in a dry season it has dried out and caked, making the crop suffer through lack of water. A comparison of the soil on an old coffee plantation with the virgin soil of elephant grass land ten yards away revealed the fact that the top soil in the first instance was very fine and dusty, four inches in depth, with no crumbs, while the virgin soil adjacent was good black soil fifteen inches deep, and well granulated.

In a comparatively short time a good soil in excellent tilth had been ruined by bad management. Clean weeding and cultivation had allowed the sun to burn out all the humus, which acts as a cement for the particles in the granule; rains had carried a lot of the soil away, and the wind was doing its best with what was left. The crop was round about 2 cwts. per acre, but this is not surprising in view of the above remarks on the water and air requirements of the plant root.

How can a good soil structure be maintained? It is seen that hoeing and clean weeding reduce the good structure to dust, brings humu to the surface to be burnt out, until finally all the humus is removed, granules are non-existant, pore space is at its minimum, heavy rain tends to wash much of this soil away, and sun following rain bakes the remainder resulting in something harder than a road.

The remedy, the secret of soil management, may be expressed in one word—Humus.

Humus puffs out or lightens a heavy clay soil owing to the carbon dioxide produced by the micro-organisms living in it, much in the same way as yeast lightens dough. Humus is also invaluable as a cement for giving a good crumbly tilth on light sandy soils. It also has a very high water retaining capacity which proves its value in drought periods.

Organic matter is the only possible food for the micro-organisms in the

soil, it is oxidised under the influence of these organisms which derive their energy from the process. Oxygen is taken up and carbon dioxide given off. This carbon dioxide dissolves in water giving a weakly acid solution which slowly dissolves plant food from the soil particles. In this way it is obvious that a soil with a large quantity of organic matter has a big population of micro-organisms, more carbon dioxide formed, a stronger carbonic acid solution and so a better chance of obtaining the mineral plant food, phosphate and potash, from the particle.

The supply of nitrogen is more directly dependent on humus than on the mineral foods of the particle. The organic matter in the soil consists of plant residues containing nitrogen which is released and made available for the plant as nitrate as a direct result of the activities of certain groups of organisms.

Other organisms deriving the necessary energy from the decomposition of humus, are able to fix atmospheric nitrogen, giving ammonia which is converted to nitrate by other organisms. Soils rich in organic matter may contain up to 1 per cent nitrogen, while in dead unfertile soils it rarely exceeds .05 per cent or 1/20 of the previous figure. On all counts, humus is essential for a soil to be fertile and it is mainly the loss of humus which has caused the gradual decrease in crop.

There is a close relation between the incidence of sucking pests and soil conditions. A healthy tree is much less likely to be attacked than a less healthy one. An instance of this is the "root mealy bug" which has been observed to do greater damage during periods of drought on soils with a poor water content, and in exceptionally wet weather on water-logged soils. In the first instance the direct cause was water starvation and in the second air starvation. The very best means of prevention is the application of humus, which increases the water retaining capacity and at the same time improves the structure and facilitates drainage.

The conclusion is that humus in the soil is most necessary: but how can it be obtained and applied?

The first and standard method is green manuring, that is, the growing and digging in of a green crop. Leguminous crops are usually chosen because they have the additional advantage of a bacterial organism, living in symbiosis with the roots, which fixes nitrogen from the air. Thus, legumes contain more nitrogen than any other crop but it does not become available for further crops until it has been ploughed in and acted on by other organisms. There is an erroneous impression that the nitrogen fixed by legume organisms is made available for other crops during the growth of the legume.

The Author instances elephant grass as an excellent mulch for coffee, but points out the danger of fire from such a mulch. Cattle manure and rotted cotton seed are also mentioned as proving useful for supplying humus.

In opening up new ground, it must be remembered that the burning of organic matter in clearing means a complete loss of valuable material and should be

avoided as far as possible.* It is important to keep the soil covered from the very beginning, because more damage is done when the coffee is young and the soil completely exposed.

Shade trees may or may not be necessary for coffee. In any case, shade is essential to conserve the all important humus.

The policy of doing nothing with the soil because it is so good that it needs nothing putting back, cannot be maintained. It is much easier and a better proposition to keep a soil in good heart than to put life into a dead soil. The policy should, therefore, be to start right by putting something into the soil each year as the crop takes its toll.

Remember that many weeds appear to be able to thrive where the main crop shows signs of failing. When these weeds are dug in and acted on by micro-organisms, the food which they have wrung from a reluctant medium becomes available for the main crop.

Lime is well known for its action in flocculating or forming granules in stiff clay and in changing the reaction of sour soils. Both these properties are valuable in improving the condition of life of the micro-organisms. Where active steps are being taken to conserve and increase the humus content of the soil it would be wise to experiment in the use of lime.

ESTIMATE OF PRODUCTION AND CONSUMPTION OF CRUDE RUBBER DURING THE YEAR 1930.

While the production of crude rubber will increase in 1930 by 68,000 tons over that of 1929, consumption will increase at the lower rate of 45,000 tons is the estimate of "The Rubber Age" of January 10th, 1930, contained in an article on the above subject. The average increase in consumption over the past six years has been 16 per cent per annum. During 1930, it is doubtful whether it will be more than 4 per cent. High stocks in hand and afloat to consuming markets and low consumption in the United States for the last three months of the year, coupled with high production of crude rubber on the estates and by native interests, is held responsible for the position.

The article concludes that the market price of crude rubber will show no advance during the year. The price will therefore be more stabilized than during any previous yearly period. On the other hand, the market price will not materially affect production during 1930.

Reclaimed rubber is expected to maintain its present position (50 per cent to the amount of crude). If crude rubber drops to below 15 cents (Gold), this rate may decline to around 40 per cent.

* The Author is here dealing with elephant grass land. In Malaya, when virgin jungle land is being opened, this destruction of organic matter seems to be inevitable. The best method of preventing loss of organic matter in such cases is to establish a cover crop as soon after the burn as possible before the humus and surface soil have been materially changed by the action of rain and sun.—Editor, M.A.J.

REVIEWS.

The Culture of Vegetables in Malaya.

BY

B. BUNTING AND J. N. MILSUM.

Special Bulletin. General Series No. 1. Department of Agriculture, S. S. and F.M.S., 78 pp. and Index. 12 Pls. Federated Malay States. Price $1.50 (Straits Currency) Post free.

In 1919, a bulletin was issued by the Department of Agriculture, S.S. and F.M.S., giving information concerning the cultivation of vegetables. This publication went through two editions and has been out of print for some time. The present bulletin has therefore been published in response to frequent requests for information on this subject.

The subject matter of the original bulletin has been completely revised, re-arranged and re-written, while the twelve full-page illustrations of the present volume are new.

"The Culture of Vegetables in Malaya" is arranged in eleven sections, viz.—climatic conditions, selection of site, soils, soil operations, manures and manuring, source and storage of seed, rotation of crops, watering, pests and diseases, vegetables suitable for different conditions, vegetables—description and methods of cultivation. It is thought that the above arrangement of sections will facilitate ready reference, for the amateur gardener generally requires a book of reference rather than a bulky treatise on the subject. For the same reason, the information has been stated as concisely as is compatible with clarity.

The vegetables suitable for cultivation in Malaya have been classified as follows:—

Low elevation —for small gardens; 14 varieties.
—for large gardens; 26 varieties.
—for coolie gardens; 21 varieties.
High elevation—for hill gardens; 26 varieties.

Following this classification, a description is given of the appearance, habits, cultivation and uses of sixty varieties of vegetables.

Disappointment in growing vegetables is frequently caused by the ravages of pests and diseases—especially the former. Some knowledge of the insects to expect and the methods of successfully combatting them is essential for obtaining even reasonably good results with the garden. The Mycologist and Entomologist in the Department of Agriculture have collaborated with the Authors in the preparation of the section dealing with this subject. Information is given not only on the nature of the more usual pests and diseases, but on the methods recommended to keep them under control. With this informa-

tion, it should be possible for the reader to protect his crops adequately from the damage occasioned by pests and diseases.

But however thorough a book on this subject may be, it must be remembered that personal interest in the garden is essential. The usual type of native gardener will achieve little success if the planting material and the instructions are given him, but he may frequently be stimulated to activity when he is aware that his master is personally interested in the venture.

"The Culture of Vegetables in Malaya" is recommended to all gardeners in this country. In method of presentation it is easy to follow, and its cost—$1.50 post free—brings it within reach of all.

D.H.G.

On Chinese Medicine:

Drugs of Chinese Pharmacies in Malaya.

BY

DAVID HOOPER, L.L.D., F.C.S.

The Gardens' Bulletin, Straits Settlements, Vol. VI.
Part I, Issued December 1929, Botanic Gardens, Singapore.
pp. 154 and Index. Price $2.50

"On Chinese Medicine: Drugs of Chinese Pharmacies in Malaya" by Dr. Hooper gives a very detailed account of the various remedies employed by the Chinese both in China and Malaya. The Author includes both official preparations and domestic remedies and all the substances described have actually been found in Malaya. There are 456 substances enumerated, all of which are named in Chinese, Romanised Mandarin and as far as possible, in English. Drugs of vegetable, animal and mineral origin are described.

Although the plant products include such well-known European medicines as cinchona, Hydnocarpus, croton and castor oil seeds, it is remarkable that on account of the poisonous nature of croton there are legal obstacles to its sale, while castor seeds are used, in the form of a paste for external application. Other remedies are mangosteen-rind, mother of ants eggs, radish, onion, plantain, mallow, 'lallang'; in fact, there appears to be no plant which the Chinese do not allege to possess curative properties.

In the animal and mineral kingdoms the list of drugs appears to be only limited by the resources of China. As Dr. Hooper says, many of the animal drugs recall those found in European pharmacy 200 years ago. They range from asses' glue, excrement of various small mammals, worms and cockroaches, to the unattractive sounding "bug with nine smells." Mineral drugs include such well-known substances as Glauber salts, borax and calomel, but also include mica.

The Author enumerates the medicinal properties claimed for the various drugs, but does not confirm the validity of such claims. This is not very surprising when it is considered that the bones of tigers, leopards and lynxes are claimed to impart bravery and strength, that various dyes by virtue of their red colour are supposed to have a special affinity for the blood, that the seed of the Tree of Heaven, on account of its resemblance to the eye of a bird, is used in opthalmic diseases, while other drugs are claimed to be "The Elixir of Longevity" and "The Elixir of Felicity."

Of the 415 vegetable substances described, only a small proportion contain an active principle known to medical science. In spite of the absurd claims made for some of the drugs, the reader is impressed by the valuable addition to Western medical science likely to result from a detailed chemical and medical study of Chinese *materia medica*.

V.R.G.

INTERNATIONAL CONGRESS OF TROPICAL AGRICULTURE, ANTWERP, 1930.

An International Congress of Tropical Agriculture is to be held at Antwerp from 28th. to 31st. July, 1930, in connection with the forthcoming International, Colonial, Maritime and Flemish Art Exhibition (Antwerp, May to October, 1930), at which about 1700 sq. ft. of space have been reserved for agricultural and other exhibits from Malaya. It is anticipated that an officer of the Department of Agriculture, S.S. and F.M.S., will attend the congress, which is organised by the Belgian Association of Tropical and Subtropical Agriculture. The subscription to the congress is Ten Shillings (or 75 Belgian Francs), and applications for enrolment should be addressed to the General Secretary, 230 Rue Royale, Brussels, who will be pleased to give further particulars.

ENTOMOLOGICAL NOTES.

FIRST QUARTER, 1930.

Tea.

Mr. N. C. E. Miller, Assistant Entomologist, has commenced a survey of the insects of tea in Malaya and has visited six estates in this connection. It is hoped that he will visit all estates and native holdings in the Peninsula. To date he has found no insects of considerable economic importance, although at Cameron's Highlands, minor damage by *Helopeltis* sp. (Mosquito blight) to young leaves and by the caterpillar (cut worm) of *Agrotis ypsilon* to seedlings was observed. This cut worm appears to confine its attention essentially to the young seedlings and apparently causes no damage to the plants after becoming established.

An enquiry was received from an estate concerning the cricket, *Brachytrupes portentosus* Licht. and the Manager's description concerning the activities of this insect is considered worth recording.

" They appear to work only in the night and have not been seen in the daytime. After nipping off the young seedlings, they burrow down into the ground anything from 2″ to 4″ and travel along at this depth, sometimes two feet taking the foliage and stems with them. The specimen seedlings and leaves enclosed were recovered from the ground. The only trace left on the top of the soil is a small mound of earth. On scraping this away a hole is exposed and on following the hole traces of leaves and stems are found. After following the hole sometimes two feet or more the insect is discovered alive." Recommendations were made for the control of this insect, but the Manager had taken the matter in hand earnestly and had caused the burrows to be traced, catching thereby ' some 12 or more ' crickets.

Coffee.

The coffee hawk moth (*Cephonodes hylas*) has been reported once during the quarter. This caterpillar is frequently very troublesome and has been known to increase to such numbers that bushes have been entirely defoliated and the berries subjected to attack. Spraying the bushes with lead arsenate has been successful, but reliance is often placed in hand collection. Comparatively recently the eggs of this moth have been found parasitised by a very active minute parasite.

The coffee berry borer (*Cryphalus hampei* Ferr) is a small beetle which bores the seeds of coffee. Coffee in Malaya has been observed with about 100% of the seeds infected. In such cases, a complete collection of all berries and the prevention of berries forming for at least six months were recommended. Such a procedure was strictly carried out on one estate with the result that the attacked berries were said to have been reduced to about 2 per cent. All

managers of coffee estates are urged not to introduce coffee berries from other estates unless accompanied by a letter or a certificate from the country of origin that the seed has been disinfected.

Oil Palms.

An enquiry was received relating to 'white ants' damaging oil palms. With the exception of the destruction of all timber, no other effective control measure has been found. The mercuric chloride treatment which has come into prominence recently provides merely temporary relief and has to be continually repeated. This measure is only recommended where for the time being, conditions render the destruction of timber impossible.

Coconuts.

The yellow nettle caterpillar (*Setora nitens*) has been troublesome in the Teluk Anson area. A paper dealing with this insect was written by Mr. Miller for the *Malayan Agricultural Journal* (Vol. XVII. No. 9 Sept. 1929) and managers of coconut estates would find this article of considerable assistance as it describes the appearance of the egg, caterpillars and cocoons and gives instructions as to control measures. In connection with this insect, it is interesting to note that a manager of an estate forwarded some Reduviid bugs (*Sycanus leucomesus* Walk.) which are predaceous on the caterpillars and since this is the first record of this bug being predaceous on *Setora* caterpillars his remarks are herewith quoted.

" This insect undoubtedly attacks the nettle caterpillar, and at the present time is to be found on almost every palm on our young clearings."

"This insect spears caterpillars of all sizes and generally has a dead caterpillar hanging on to its ' spear.' It undoubtedly helps to keep the nettle caterpillar on control.

" ..... also that it might be possible (if it has no other damaging properties) to encourage it to breed on coconut estates."

The adult bug is black with orange coloured wings and is about 20 m.m. in length. The nymphs (young bugs) are orange red with black markings. This insect has been recorded feeding on a number of other insects in Malaya. It causes no damage to plants and the nymps and adults undoubtedly should be protected.

Further observations on the greater coconut spike moth (*Tirathaba rufivena* Walk.) have been made. Removing the enveloping sheath just before the spike would burst to allow the inflorescence to spread quicker, has been demonstrated to control the caterpillars, and managers of estates are invited to remove the sheath from spikes on a small area in order to find out if an increase of nuts per acre is thereby obtained.

Padi.

The continuation of the breeding of and liberation of egg parasites (*Trichogramma nanum*) to control caterpillar borers of padi have been continued

and whilst breeding of the parasites on the eggs of a grain moth has been carried out in Kuala Lumpur, Mr. H. T. Pagden, Assistant Entomologist, has been stationed, since the middle of February, in the Krian District of Perak, in order to make an intensive study of these borers and to observe the behaviour of the parasites in the field. It is interesting to record that during the months of January, February and March a total of about 3,000,000 parasites were despatched from Kuala Lumpur for liberation in the Krian district. At the present time, no definite statement as to the success or otherwise of this work can be given, but indications are not wanting that 'bored' padi in "liberation" areas is less than in "non-liberation" areas.

General.

A most unusual outbreak of a *Cicada* occurred recently in East Pahang. Capt. J. M. Howlett, Agricultural Field Officer, Pahang East, forwarded a specimen of a coconut leaf shewing eggs in the mid-rib and sent information that he had found them in twigs of various other plants growing at the Experiment Station. He records the following plants attacked—*Tephrosia candida*, *Crotalaria anagyroides*, peach almond, banana, guava, pineapple, coffee, tomato, brazil nut, papaya, sennudok, coconut, soursop, quini and beraksa.

The cause of the damage is a green coloured *cicada*. The seventeen year old *cicada* in America is the classic example of this group of insects as it takes 17 years to reach maturity from the egg. This cicada damages fruit trees by laying its eggs in the twigs. Pruning and burning is postponed until egg-laying has been completed, after which prunings are burnt.

Advice was sought as to exterminating white ants from a building. The foundations of buildings should be made of cement concrete in which no lime has been incorporated. Lime is no material hindrance to the advance of white ants as they are capable of exuding an acid, thereby dissolving out the lime.

G. H. C.

Forwarded for publication April 1st, 1930.

DEPARTMENTAL NOTES.

Visit of His Excellency the Governor.

His Excellency, Sir Cecil Clementi, K.C.M.G., Governor and Commander in Chief of the Straits Settlements and High Commissioner of the Malay States, visited the Headquarters of the Department of Agriculture, Kuala Lumpur, on 15th March, 1930.

Laying of Foundation Stone of the School of Agriculture, Malaya.

His Highness The Sultan of Selangor (Ala'idin Sulaiman ibni Almerhum Raja Muda Musa, G.C.M.G.,) accompanied by the Chief Secretary to Government, The British Resident of Selangor, the Director of Agriculture and other distinguished guests, laid the Foundation Stone of the School of Agriculture, Malaya, at the Government Experimental Plantation, Serdang, Selangor, at 4 p.m. on the 19th March, 1930.

The Director of Agriculture (Dr. H. A. Tempany) gave a brief account of the proposals which led to the erection of the present building and pointed out that the school should not be considered as filling all the needs of agricultural education in Malaya, but as one of the links of a scheme of education which would commence in the vernacular schools and terminate in this School of Agriculture.

His Highness, after performing the ceremony, spoke of the importance of education in agriculture, and the effect that it must have in improving crop production.

The Director of Agriculture visits Perak.

The Director of Agriculture was on tour in Perak and the Dindings from 20th to 27th March. Among places visited was the important Kenas irrigation area and the Krian irrigation area.

Economics of the Rice Situation.

The Director of Agriculture (Dr. H. A. Tempany) delivered a lecture on the above subject at a meeting of the Malacca Planters' Association on the 9th March, 1930. The subject is one of great importance to Malaya, for which reason a resume of the main points of Dr. Tempany's lecture will be published in the next number of *The Malayan Agricultural Journal.*

Vernacular Publications.

The current number of *Warta Perusaha'an Tanah,* the agricultural journal in the Malay language, published quarterly, contains, in addition to an editorial, articles on A 'nettle' Caterpillar of Coconut Palms; Stem Borers of Padi; The Malayan Buffalo; Rinderpest; and School Gardens in Malaya. The journal,

now in its eighth annual volume, is becoming increasingly popular, 5,000 copies of each issue being distributed.

The Chinese Agricultural Journal commences its fourth year of publication with the issue of March 1930. It contains the articles on A 'nettle' Caterpillar of Coconut Palms; The Malayan Buffalo; Rinderpest; and in addition, an article on Education in Relation to Agriculture.

It will be seen that while some papers are suitable for publication in both of these journals, due regard is given to the fact that the Malay and Chinese agriculturists are at different stages of agricultural development, the subject matter for these publications has therefore to be very carefully revised to suit the requirements of each journal.

Articles that appear in *The Malayan Agricultural Journal* are rarely suitable for publication in either of the vernacular journals without considerable revision. Many of the articles in the Malay and Chinese journals are especially written with that purpose in view and in the supply of suitable articles, the Department of Agriculture has received valuable support from other departments; notably, the Rubber Research Institute of Malaya and the Co-operative Department.

Leave.

Mr. W. N. C. Belgrave, Plant Physiologist, returned from leave of absence on the 10th March, 1930.

Dr. H. W. Jack, Economic Botanist, returned from leave of absence on the 20th March, 1930.

FROM THE DISTRICTS.

The Weather.

The spell of drought broke definitely during the month. In the central portion of the Peninsula, rain came in the form of occasional and rather local showers and thunderstorms. In the north, there were heavy showers and thundersorms on most evenings after the middle of the month, while on the east coast of Pahang and in the south the first half of the month was generally wet.

Remarks on Crops.

Rubber.—By the end of the month, wintering had practically finished and the young foliage was developing. The showers which fell were sufficient to assist leaf development, but, except in Larut district, did not cause any noteworthy increase in diseases, such as Mouldy Rot which remained little in evidence. Outbreaks of secondary leaf fall caused by *Oidium heveae* were, however, recorded from certain localities in Negri Sembilan and Malacca.

In Pahang West, the effect of wintering and the long drought have decreased yields to such an extent that in some areas tapping has had to be stopped. It was estimated that in Singapore Island, at least half of the rubber trees were not being tapped. Excessive tapping appears to be prevalent on small holdings in Selangor. Very fair smoked sheet is being produced by smallholders in certain mukims around Pekan in eastern Pahang.

Padi.—Harvest was practically completed in all districts, except Province Wellesley South, Krian, Lower Perak, the coastal mukims of Kuala Selangor, the coastal mukims of Pahang and the Northern district of Malacca around Mor Gajah.

In Temerloh district, Pahang West, planting of nurseries was scheduled to commence during February, but this operation was prevented by drought. It is to be hoped that rain will fall soon, as early planting is essential in the river mukims of this district if the harvest is to be reaped before the flood season commences. In Pahang East, preparation of land was in progress in the mukims along the Pahang river and nurseries were just being sown.

The comparative failure of the padi crop in Kedah and in the Settlement of Penang has not been attended by a rise in the local price of padi, the price, at 11 to 12 cents per gantang, being actually lower than that realised in the last two seasons.

Tea.—In addition to the 5,750 acres already alienated near Camerons Highlands, a further 3,297 acres in this neighbourhood is under approved application, but the terms have not yet been accepted by the applicants. The crops to be grown include tea, Arabian coffee, cardamoms cinchona, vegetables and fruits.

Pineapples.—In Singapore prospects of a good crop appear very favourable. During the month, the young pines made considerable progress, probably owing

to the good rains in the first half of the month. Canning factories recommenced operations in the second half of the month when small quantities of early fruit were received, mostly from Johore.

Food Crops.—In Pahang West large areas of maize and to a less extent of tapioca and sugar cane are being planted in many of the river mukims where rice supplies are short. State Land along the river banks is being cleared on Temporary Occupation Licence. Similar measures are being undertaken in parts of Kedah where the rice crop has failed.

Fruit.—In Pahang East, duku, rambai, pomelo, mango and lime were fruiting.

Live Stock.

An area of over 14 acres of land within 1½ miles of Teluk Anson has been granted on a 15 year lease for the purpose of establishing a dairy, from which milk and live stock will be sold in the town.

Exhibition for Tourists.

On March 2nd and 6th a small exhibition was put up in Malacca for passengers from tourist ships. This included padi and the implements used in its cultivation, oil palms, coconuts, Malayan pineapples, kapok and collections of local fruit and vegetables. The visitors were much interested in the exhibits and a number of enquiries were made with regard to the major crops.

Work in Conjunction with the Co-operative Department.

A lecture on banana cultivation was prepared by the Agricultural Field Officer, Perak South, and delivered by the Junior Agricultural Assistant, Kinta, to a meeting of the Tronoh Co-operative Credit Society. It was attended with interest by thirty-two Malays who at the completion of the lecture brought up a few of their agricultural problems.

Notes on Demonstration Stations and Padi Test Plots.

Poultry Station, Kuala Kangsar.—The first settings of eggs incubated at this station gave a very high proportion of failures. It was thought that many of the eggs were infertile, but it has since been found that this is not the only cause of the failure. The matter is being investigated.

Seremban Demonstration Station.—Harvesting of Salisbury White Sweet Corn was started, the seed obtained will be distributed to school gardens. Greater yam No. 30 was also harvested and is being multiplied for distribution.

Kuala Lipis Demonstration Stations.—A few of the orange trees planted at the end of 1927 commenced to bear fruit. The food crop plots were harvested and a considerable quantity of planting material including maize, groundnuts, cowpea, soya bean, sweet potato and red gourd is available for distribution to

school gardens. Eight varieties of cover crop and green manure plants were planted during the month.

Pekan Demonstration Station.—Two new bullocks were purchased and broken to plough. Marcots of lemon, lime and chiku are now available. Plants distributed included bananas, yams, dwarf coconuts, tebu bertelor and packets of various vegetable seeds, including tomato.

Considerable progress was made in the selection of sites for additional demonstration stations and padi test plots in most States and Settlements.

School Gardens.

Regular inspections of school gardens were carried out in all parts of the country. Most of the schools remained closed for the holidays until about the middle of the month. In the majority, therefore, the beds were being dug over and replanted. Some have been given careful attention during the absence of the scholars, but a number of others have been badly neglected and will require considerable attention. In many instances more use should be made of local vegetation or neighbouring supplies of cattle manure for improving the soil, while compost heaps for supplying humus are still needed in a number of gardens.

In Malacca, the Inspector of Schools and the Agricultural Field Officer scrutinised the marks given to the schools for their gardens for the year 1929. Kesang Tua and Brisu were placed top together and Pengkalan Baluk third. The standard generally was high and the marks very close.

Rats.

In Krian, the rat campaign was continued and 6,871 tails were collected. In Province Wellesley, the campaign accounted for 76,489 rats, the majority of which were young rats taken from nests in the "batas" of padi fields and brought in by Tamil coolies. Poison baits distributed amounted to 4,800. Little or no rat damage has been reported.

In Malacca, work was confined to destruction of rats in the "batas" of padi fields. Where flooding had resulted from recent showers no rats were found.

MARKET PRICES.

MARCH, 1930.

Rubber.—The average London price for rubber in March, 1930 was 7.6 pence per lb. being a fall of .3 pence over the previous month. The price varied very slightly throughout the period. The average Singapore price was 25.43 cents per lb. compared with 26.25 cents in February. The fluctuation was between 26 cents and 24¼ cents per lb.

Copra.—Singapore prices for copra shew a further decline, recovering somewhat at the end of the month. Average prices per picul of 133⅓ lbs. F.M. $8.54 against $8.84 in February; S.D. $8.90 against $9.31 in February. The Singapore Chamber of Commerce reports transaction amounting to 2327 tons for the period 24th February to 22nd March.

Gambier.—Singapore average prices: Bale $8.97 per picul, against $8.96 in February 49 tons being recorded; Cube Nos. 1 and 2 $15.71 against $15.50 for the previous month.

Nutmegs.—Average prices: 110 per lb., $35.50 per picul; 80 per lb., $38.75, against $43.20 and $44.80 respectively for February.

Pepper.—Black; $47.31 per picul against $50½ in February, 109 tons being recorded; White Sarawak, $67.34—130 tons, against the February average price of $75 per picul.

Rice.—Siam rice rose in price from $331 per coyan to $352—average $339.50; Saigon, white fluctuated between $244 and $250—average $247; Rangoon, white appreciated in price from $215 to $235—average $222 per coyan. The average prices per coyan for February were $384.60, $253.80, $239.60, respectively.

Sago.—Singapore average prices: Pearl, Fair $7.03 per picul, 105 tons against $7.20 in February; Flour $3.92 per picul, 1072 tons being recorded, compared with $4.20 per picul in February.

Tapioca.—Average prices in Singapore; Flake small, fair, $5.57, (920 tons) against $5.84 per picul in February; Pearl, fair, $7.47 per picul (166 tons) compared with $7.95 in February.

The above market prices are based on the daily cabled London quotations for rubber and on the Singapore Chamber of Commerce Market Reports covering the period 24th February to 22nd March, 1930, and from other local sources.

1 Coyan = 40 piculs 1 picul = 133⅓ lbs.

The dollar has been fixed at 2 shillings and 4 pence.

MALAYA RUBBER STATISTICS.

STOCKS OF RUBBER INCLUDING LATEX AND REVERTEX HELD BY DEALERS AND ESTATES OF 100 ACRES AND OVER, TOGETHER WITH THE DECLARED PRODUCTION OF THE SAME ESTATES, IMPORT AND EXPORT FIGURES, AND ESTIMATED FIGURES OF THE PRODUCTION OF ESTATES OF LESS THAN 100 ACRES, FOR THE MONTH OF FEBRUARY, 1930, IN DRY TONS.

Territory	Stocks at beginning of month			Production by estates of 100 acres and over		Production by estates of less than 100 acres (estimated)		Imports				Exports (including re-exports)				Stocks at end of month		
								during the month		during the year 1930		during the month		during the year 1930				
	Ports	Dealers	Estates of 100 acres and over	during the month	during the year 1930	during the month	during the year 1930	Foreign	From Malay States	Foreign	From Malay States	Foreign	Local	Foreign	Local	Dealers	Estates of 100 acres and over	Ports
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
MALAY STATES																		
Federated Malay States	...	11,753	16,226	11,112	24,677	11,248	22,820	Nil	7	Nil	16	17,999	6,078	35,267	12,681	11,941	14,338	
Johore	...	2,172	5,494	3,399	7,363	4,471	9,051	Nil	Nil	Nil	Nil	1,069	7,048	1,932	15,010	2,379	5,040	
Kedah	...	537	2,247	1,751	3,946	1,408	3,085	1	Nil	2	Nil	813	2,894	1,584	5,965	359	1,878	
Perlis	...	21	7	8	18	22	34	Nil	Nil	Nil	Nil	Nil	21	Nil	47	28	9	
Kelantan	†	—	—	—	—	—	—	6	Nil	9	Nil	64	718	135	1,357			
Trengganu ...								Nil	Nil	Nil	Nil	Nil	153	Nil	345			
STRAITS SETTLEMENTS																		
Malacca	...	2,482	1,904	1,167	2,646	*	—	Nil	1,107	Nil	2,207	4,098	Nil	8,747	Nil	2,505	1,649	
Province Wellesley	...	150	807	463	1,074											143	638	
Dindings	...	47	163	93	200			1,059	3,732	1,938	7,783	6,640		12,628		94	147	
Penang	1,834	4,977	19	8	21											5,377	7	1,859
Singapore	4,425	27,875	411	243	517			9,306	12,068	18,375	25,406	20,170		41,478		31,214	410	4,962

ANALYSIS OF COLONY AND FEDERATED MALAY STATES DEALERS, STOCKS AT END OF MONTH, IN DRY TONS.

Class of Rubber	Federated Malay States	Singapore	Penang	Province Wellesley Dindings and Malacca	Johore	Kedah	Gross total
(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)
Smoked sheet ...	8,709	11,912	3,545	1,489			25,655
Crepe	726	15,683	909	618	—	—	17,936
Unsmoked sheet ...	1,230	3,619	923	635			7,683
Scrap and lump ...	1,276						
Total all Grades ...	11,941	31,214	5,377	2,742	2,379	359	54,012

Notes.—1. Stocks on estates of less than 100 acres and stocks in transit on rail, road or local steamer are not ascertained.

*2. The production of estates of less than 100 acres is estimated from the formula: Production + Imports + Stocks at beginning of month = Exports + Stocks at end of month; i.e., Column (7) = Columns (13) + (14) + (17) + (18) + (19) — (2) — (3) — (4) — (5) — (9) — (10). The formula is not applied, for the present, to the Straits Settlements, owing to the uncertainty of the true weight of foreign imports. No estimate, therefore, is made of domestic production.

3. Colony Dealers' stocks are as published in Return I. & E. 6, dated March 11. The ratio of the reduction on wet rubber, taken from dealers' return, is 21.8% for Singapore and 16.5% for Penang (*S.S. Gazette* Notification No. 508/1930). The ratios for January should read as 28 and 10%.

4. Malay States Dealers' Stocks are reduced by the following fixed ratios: Unsmoked sheet, 15%; wet sheet, 25%; scrap, lump, etc., 40%.

5. Foreign imports are as published in Return I. & E. 5, dated March 7, reduced to dry weight by the percentages in Note 3 (*S.S. Gazette* Notification No. 506/1930).

6. Foreign exports are those of each State and Settlement as published in the Malaya Monthly Trade Return (Appendix II), and are distinct from Ocean-Shipments of published in Return I. & E. 4, dated March 7 (*S.S. Gazette* Notification No. 507/1930).

† 7. The States of Kelantan and Trengganu have no organisation at present for the collection of returns of stocks and production, the latter can be estimated as equivalent to exports.

8. All statements are brought up to date monthly and any inaccuracies that may be disclosed are corrected in the totals. The latest publication is therefore always the most reliable.

KUALA LUMPUR,
March, 1930.

J. GORDON-CARRIE,
for Acting Registrar-General of Statistics, S.S. and F.M.S.

METEOROLOGICAL SUMMARY, MALAYA

JANUARY, 1930.

Locality	Air Temperature in degrees Fahrenheit											Earth Temperature		Rainfall				Number of Days					Bright Sunshine		
	Means of		Mean of A and B	Absolute Extremes										Total		Most in a day									
	A. Max.	B. Min.		Highest Max.	Date.	Lowest Min.	Date	Lowest Max.	Date	Highest Min.	Date	At 1 foot	At 4 feet			Amt.	Date	Precipitation	Precipitation, 1mm. or more	Thunderstorm	Thunder heard	Fog morning obs.	Total	Daily Mean	Length of Day
	°F	°F	°F	°F		°F		°F		°F		°F	°F	in.	mm.	in.							hr.	hr.	hr.
Railway Hill, Kuala Lumpur, Selangor ...	90.6	71.2	80.9	95	15th	67	9th	78	7th	73	—	82.9	83.1	8.41	213.36	2.90	16th	17	13	2	15	...	206.75	6.67	
Bukit Jeram, Selangor ...	88.4	71.3	79.9	91	17th	69	19th	83	7th	74	26th	83.9	85.3	5.09	129.3	1.60	6th	14	10	...	22	1	234.65	7.86	
Temerloh, Pahang ...	88.0	70.8	79.4	93	28th	67	30th	74	7th	73	Several	83.1	83.7	2.03	51.57	.77	12th	10	8	1	4	10	226.25	7.30	
Kuala Lipis, Pahang ...	86.8	70.2	78.5	90	Several	68	2nd, & 7th	74	7th	73	26th	81.2	81.4	6.18	156.98	3.49	28th	14	4	2	7	8	200.15	6.46	
Kuala Pahang, Pahang ...	82.9	74.1	78.5	85	,,	70	7th	75	7th	79	29th	81.0	82.7	16.17	410.7	5.43	6th	19	17	...	...	...	193.85	6.25	
Cameron's Highlands, Rhododendron Hill, Pahang ...	70.6	59.3	64.9	73	10, 18 & 25th	56	6th	63	7th	60	Several	...	...	5.71	144.9	0.84	16th	18	12	...	7	3	139.90	4.51	
Cameron's Highlands, Tanah Rata ...	70.8	55.7	63.3	73	Several	48	30th	65	7th	61	23rd	67.6	68.6	6.40	162.5	1.20	21st	19	12	...	7	...	133.60	4.31	
Fraser's Hill, Pahang ...	70.0	60.4	65.2	74	25th	58	Several	60	7th	64	26th	69.9	70.1	6.68	...	1.26	11th	19	16	2	13	26	143.50	4.63	
Mount Faber, Singapore ...	86.4	72.2	79.3	90	26th	70	30th	76	6th	73	Several	79.2	80.7	4.07	...	0.83	15th	17	12	2	8	...	195.60	6.31	
Bukit China, Malacca ...	80.0	76.0	82.0	91	Several	71	Several	81	8th	76	26th	83.1	83.7	1.23	31.25	0.46	21st	10	4	1	5	1	252.95	8.16	11.30
Kluang, Johore ...	85.8	71.4	78.6	89	1, 27 & 28th	69	30th	73	7th	73	Several	79.2	80.5	5.32	135.1	2.67	9th	12	11	...	2	2	212.25	6.84	10.85
Bukit Lalang, Mersing, Johore ...	82.7	74.0	78.3	85	Several	69	21st	75	6th	77	,,	78.9	79.3	11.84	300.7	4.00	5th	...	...	...	1	1	218.05	7.03	
Alor Star, Kedah ...	92.0	70.3	81.1	95	22nd & 29th	68	15th & 22nd	88	1st	73	13th & 28th	83.7	84.9	0.46	11.68	.21	1st	3	..	...	3	...	291.25	9.40	
Kota Bharu, Kelantan ...	85.0	71.2	78.1	86	Several	68	Several	84	Several	74	13th	81.5	82.4	2.61	66.30	.46	11th	18	16	...	...	...	243.15	7.84	
Kuala Trengganu, Trengganu ...	83.7	71.3	77.5	85	1, 17 & 18th	67	20th	78	11th	77	24th	80.4	81.1	7.47	189.75	1.80	11th	20	18	...	...	3	230.85	7.45	

Compiled from Returns supplied by the Meteorological Branch, Malaya.

METEOROLOGICAL SUMMARY, MALAYA.

FEBRUARY, 1930.

Locality	Air Temperature in degrees Fahrenheit										Earth Temperature		Rainfall				Number of Days					Bright Sunshine		
	Means of			Absolute Extremes									Total		Most in a day									
	A. Max.	B. Min.	Mean of A and B	Highest Max.	Date	Lowest Min.	Date	Lowest Max.	Date	Highest Min.	Date	At 1 foot	At 4 feet			Amt.	Date	Precipitation	Precipitation, 1mm. or more	Thunderstorm	Thunder heard	Fog morning obs.	Total	Daily Mean	Length of Day
	°F	°F	°F	°F		°F		°F		°F		°F	°F	in.	mm.	in.							hr.	hr.	hr.
Railway Hill, Kuala Lumpur, Selangor ...	82.6	71.9	82.2	96	26th	69	1st	88	8th	75	27th	83.8	83.9	3.57	90.69	1.20	9th	8	7	...	2	...	232.80	8.52	
Bukit Jeram, Selangor ...	90.9	71.9	81.4	94	23, 27	70	Several	89	Several	74	Several	87.3	87.3	0.18	4.6	0.13	8th	2	2	...	12	...	267.45	9.55	
Temerloh, Pahang ...	90.7	70.5	80.6	95	Several	68	,,	83	16th	75	26th	84.7	84.7	1.53	38.87	1.22	8th	5	4	1	2	7	218.40	7.80	
Kuala Lipis, Pahang ...	83.4	71.1	79.7	93	25th	69	20, 21	83	16th	73	Several	82.2	81.9	3.43	87.13	1.45	9th	11	8	2	3	9	200.15	7.15	
Kuala Pahang, Pahang ...	80.3	75.2	80.3	87	Several	70	16th	81	16th	79	,,	85.0	84.9	1.78	45.22	0.78	16th	9	5	...	...	...	235.65	8.4 2	
Cameron's Highlands, Rhododendron Hill, Pahang ...	72.6	58.4	65.5	79	5th	56	20th	67	15th	60	,,	...	...	0.64	16.4	0.37	8th	8	2	...	7	3	180.40	6.44	
Cameron's Highlands, Tanah Rata ...	72.6	53.9	63.2	76	5, 28	46	23rd	69	15, 17	60	,,	68.1	68.3	0.90	22.86	0.50	8th	9	3	...	7	...	173.35	6.19	
Fraser's Hill, Pahang ...	71.7	60.8	66.3	75	Several	58	15th	68	17th	63	,,	71.0	71.0	2.23	56.65	0.72	16th	12	11	1	8	22	168.05	6.00	
Mount Faber, Singapore ...	83.5	71.9	80.2	91	7, 25	70	Several	85	8th	74	27th	81.0	82.0	3.12	79.26	1.23	9th	6	5	2	4	...	235.0	8.39	
Bukit China, Malacca ...	89.4	73.5	81.5	93	6th	71	16th	84	8, 26	76	27th	84.6	84.8	3.28	83.33	1.70	10th	4	4	...	6	...	246.05	8.79	11.35
Kluang, Johore ...	88.6	71.4	80.0	94	25th	68	Several	83	17th	73	Several	80.8	81.3	1.37	34.8	0.61	16th	6	5	...	2	2	233.60	8.34	
Bukit Lalang, Mersing, Johore ...	84.3	73.0	78.7	86	28th	68	,,	82	17th	78	14, 24	78.1	79.6	1.99	50.6	0.89	17th	...	...	...	1	...	263.55	9.41	
Alor Star, Kedah ...	93.8	70.8	82.3	98	22nd	67	21st	89	Several	75	3rd	85.2	85.7	0.45	11.43	0.25	3rd	4	...	..	11	..	260.80	9.31	
Kota Bharu, Kelantan ...	86.0	69.8	77.9	89	9th	65	6th	83	,,	74	17, 18	81.7	82.4	2.08	52.84	1.18	15th	4	4	...	...	..	249.95	8.93	
Kuala Trengganu, Trengganu ...	85.0	70.9	77.9	88	26th	65	6th	83	16th	75	18th	81.5	82.0	1.60	40.65	1.08	15th	11	7	...	..	3	258.10	9.22	

Compiled from Returns supplied by the Meteorological Branch, Malaya.